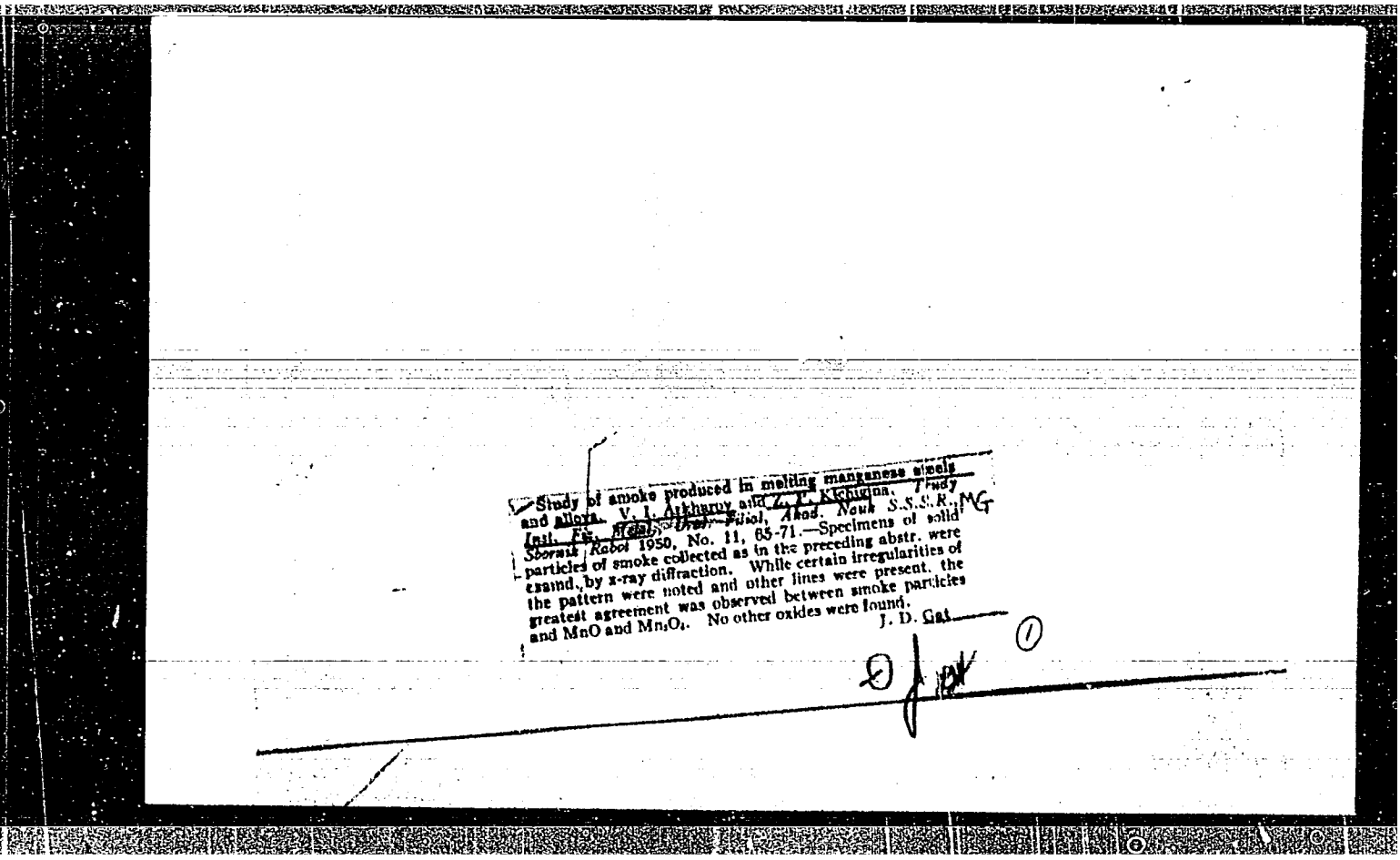
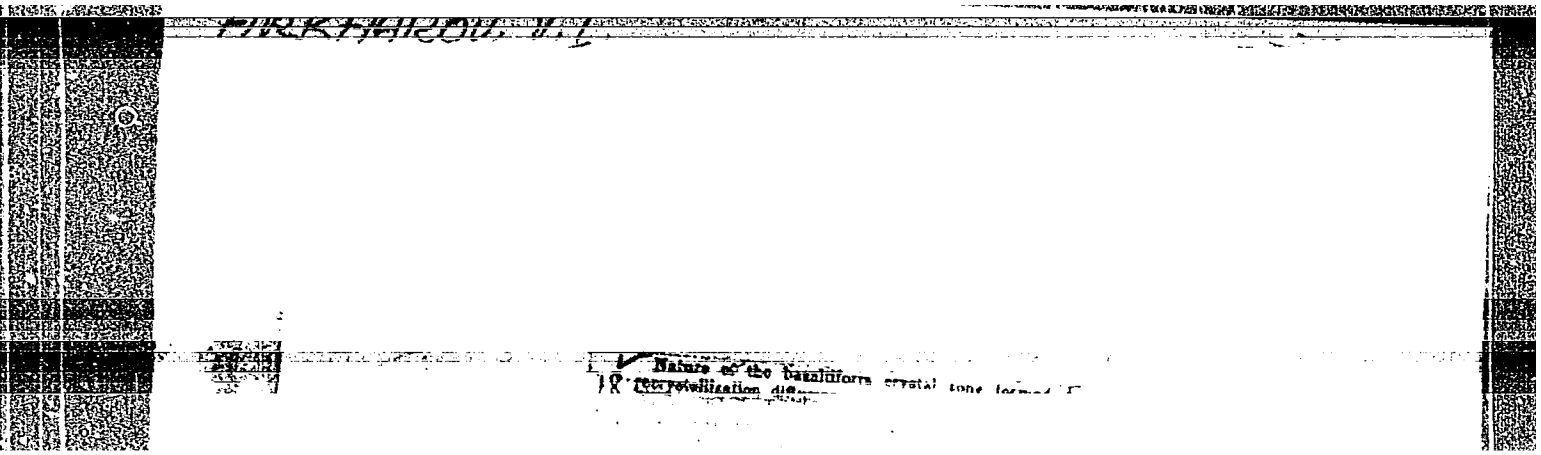


Study of smoke produced in melting manganese steels and alloys. V. I. Arkharov and Z. F. Kichigina. Trudy Inst. Fiz. Metal., Otdel. Fiziol. Akad. Nauk S.S.S.R., MG Sbornik Rabot 1950, No. 11, 65-71.—Specimens of solid particles of smoke collected as in the preceding abstr. were examd. by x-ray diffraction. While certain irregularities of the pattern were noted and other lines were present, the greatest agreement was observed between smoke particles and MnO and Mn_3O_4. No other oxides were found.

J. D. Gat



J. D. Gat

Influence of small additions of antimony on frontal diffusion of silver in polycrystalline copper. V. I. Arkharov and T. Yu. Gol'dshtein. *Trudy Inst. Fiz. Metal., Ural. Filial, Akad. Nauk S.S.S.R., Sbornik Rabot* 1950, No. [illegible], 81-9. Theory of the effect of horophilic additns. is summarized, and its predictions are checked by diffusing, at 650-700°, Ag into spectroscopically pure Cu or Cu alloyed with 0.003-4.7% Sb. The diffused layer is examd. after being etched with a $NH_4(OH)$-$(NH_4)_2S_2O_3$ soln. The diffusion front of Ag into pure Cu is either uniform or slightly indented, but its diffusion into Cu-Sb alloys shows large wedges along grain boundaries which increase with the grain size, but become smaller with higher Sb concns., though the width of the diffusion zone grows from 22 μ for pure Cu to 455 μ for the alloy contg. 4.72% Sb. The space lattice of Cu is expanded by larger Sb atoms thus helping Ag diffusion. In low-Sb alloys, Sb concns. inside of the grains and at the boundaries differ because of its horophilic properties, and the rate of diffusion is greater also along grain boundaries, showing itself in wedges penetrating along the boundaries far ahead of the av. front. In small-grained samples the wedging effect is less pronounced on account of more pronounced sidewise diffusion, but the thickness of the diffusion layer is greater here. J. D. Gat

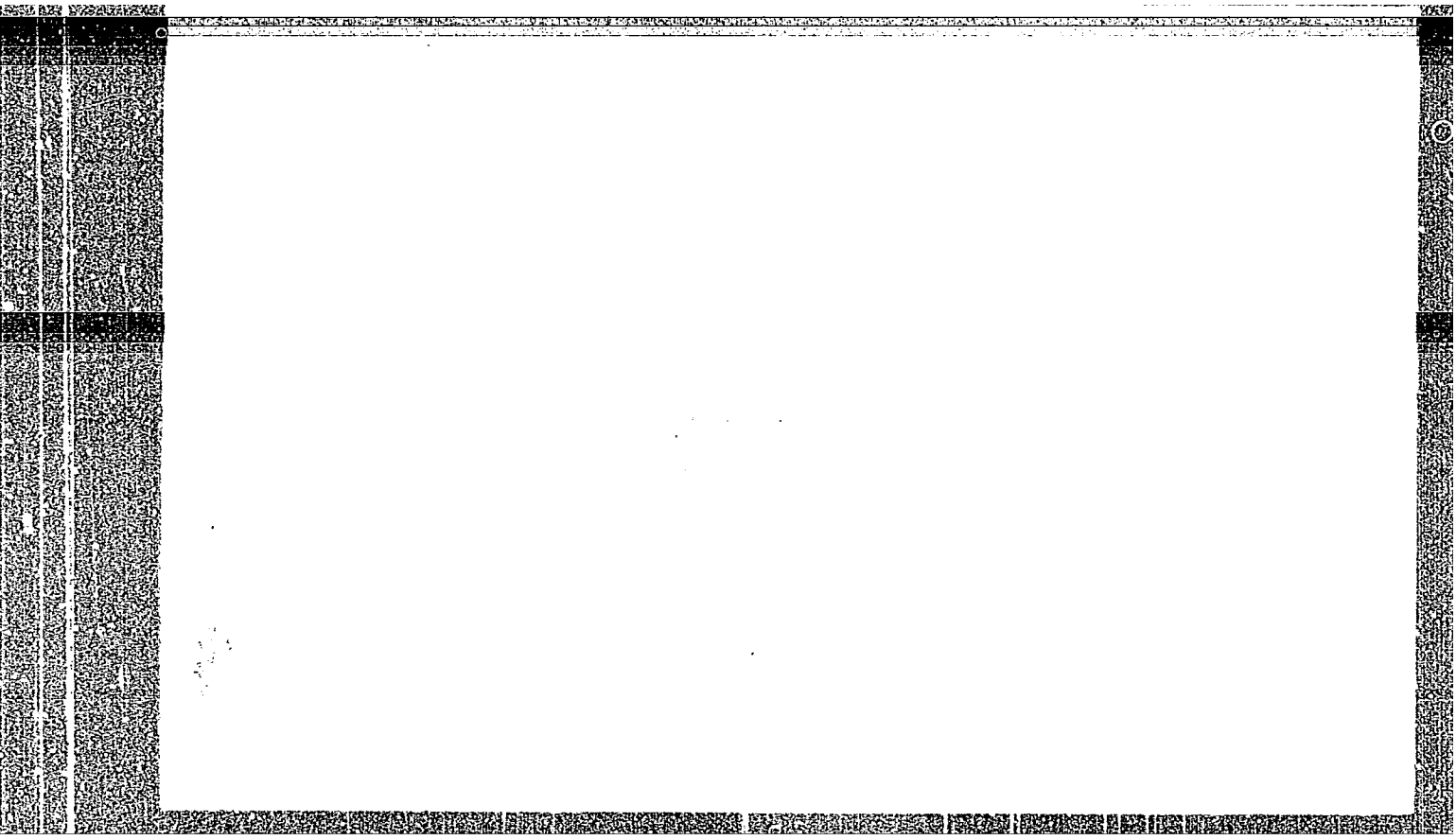
MG

(1)

ARKHAROV, V.I.; GOL'DSHTEYN, T.Yu.

Effect of small admixtures on the dissociation process of supersaturated solid solutions. Trudy Inst. fiz. met. no.11:104-113 '50. (MLRA 10:8)

(Solutions, Supersaturated)
(Dissociation)
(Metallography)



APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000102110006-0"

ARKHAROV, V. I. PA 165T56

USSR/Physics - Austenite 11 Feb 50
Steel

"Connection Between the Crystal Lattice Parameter (Grating Spacing) of Austenite and the Beginning of Martensite Conversion in Iron and Carbon Alloys," V. I. Arkharov, Inst of Phys of Metals, Ural Affiliate, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXX, No 5, pp 833-836

Sadovskiy and Yakutovich first discovered that, at temperature of beginning martensite conversion in all carbon steels, grating spacing of austenite is identical no matter what the carbon content. This critical value of grating spacing was found to be

165T56

USSR/Physics - Austenite (Contd) 11 Feb 50

3.607 A. Arkharov theorizes that this is fundamentally due to martensite's coefficient of thermal expansion being substantially less (2-2.5 times) than that for austenite. If changes in grating spacing of martensite lattice are extrapolated to high temperatures, it can be established that difference of diagonals of lattice cells joining in conversion is higher at high temperatures and decreases with cooling. Beginning of martensite conversion can be linked with attainment of a critical value by this difference. Submitted 8 Dec 49 by Acad I. P. Bardin.

[redacted] 1/ 165T56

ARKHAROV, V.I.

PHASE X TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 655 - X

Call No.: AF501905

BOOK

Author: ARKHAROV, V. I.
Full Title: CRYSTALLOGRAPHY OF THE HARDENING OF STEEL
Transliterated Title: Kristallografiya zakalki stali

PUBLISHING DATA

Originating Agency: None
Publishing House: State Scientific and Technical Publishing House of Literature on Ferrous and Nonferrous Metallurgy
Date: 1951 No. pp.: 144 No. of copies: 5,000
Editorial Staff
Appraiser: Volovik, B. Ye., Prof., Doc.

PURPOSE AND EVALUATION: This book is intended for scientific workers and engineers engaged in the field of metallography and heat treatment of metals. The presentation of the subject is descriptive without bringing experimental data. A number of diagrams show in a geometrical form the different combinations of transformation from a face-centered cubic lattice of gamma-phase of austenite to a body centered cubic lattice of alpha-phase in martensite as suggested by G. V. Kurdyumov and supplemented by the author's own remarks. Among many books which discuss problems and theories connected with the crystallography of the austenite to martensite transformation, the

Table of Contents

ARKHAROV, V.I.

Basic concepts of the theory of phase transformations in solid bodies. Izvest. Akad. Nauk S.S.S.R., Otdel Tekh. Nauk '51, 1744-51. (CA 47 no.14:6729 '53) (MLRA 4:11)

CA

9

Some questions of orientational and dimensional correlation in the martensite transformation of austenite in steel. V. I. Arkharov. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 15, 9–18 (1951).—An effort was made to find in the austenite lattice the structure which will form α-phase in a diffusion-free transformation. It is shown that the thermal expansion coeff. of martensite is 2 to 2.5 times smaller than the coeff. of austenite. The growth and shape of martensite crystals is discussed. S. Pakswer

V. I. ARKHAROV

Metallurgical Abstracts
July 1954
Properties of Metals

Inst Phys of Metals,
Ural Affil, AS USSR

(3) 4

V *Internal Adsorption of Silver in Platinum. V. I. Arkharov, E. V. Sorokin, and T. P. Chukina (*Doklady Akad. Nauk S.S.S.R.*, 1951, 76, (2), 209-210).—[In Russian]. Variations in the distribution of Ag in Pt–0·5% Ag solid soln. have been studied. Sheet specimens measuring 10 × 50 × 1 mm. were held at the temp. of max. solubility of Ag (1180° C.) for 2 hr., quenched in water, then immersed in 250 c.c. *aqua regia* at 20°–25° C. for 5 min.; during this period a surface layer $2·5 \times 10^{-4}$ cm. thick was removed, corresponding to a loss in weight of 0·6 mg. (surface area = 11·2 cm.²). After removing the specimen from the acid, washing, and drying, the cycle of thermal and chem. treatments was repeated 80 times, the weight being determined before and after each etching. There was no change in weight during heat-treatment; the total loss in weight was 50·5 mg. The same portion of etchant was used each time, the resulting soln. being evaporated to dryness and the residue (I) analysed spectrographically. In control experiments, a specimen heat-treated at 1180° C. and quenched was given a single 150-min. etch in *aqua regia* at 28° C. (loss in weight = 50 mg.) (II); and 50 mg. pure Pt and 0·25 mg. pure Ag were dissolved in another portion of acid (III). These control soln. were also evaporated to dryness and analysed. A 5-amp. D.C. arc between Hilger pure C electrodes, 2-mm. gap, and 2-min. exposure were used. The intensities of the Ag lines (3382·9 and 3280·7 Å.) relative to those of Pt (3004·7, 2920·8, and 2659·4 Å.) were less for II and III than for I, showing that in the quenched alloy the concentration of Ag in the surface layers is greater than its mean concentration, i.e. there is positive internal adsorption. To confirm this, 2·5 g. filings (0·05–0·1 mm.) of the alloy, heated at 1180° C. for 40 min. then quenched, were given a single etch in *aqua regia* for 5 min., 60 mg. being dissolved. Analysis of the soln. again gave more intense Ag lines than in the case of the control soln.—G. V. E. T.

ARKHAROV, V. I.

USSR/Engineering - Tools, Spark Cutting 1 Jun 51

"Causes of Improvement in Durability of Cutting Tools Due to Electric Spark Working," V. I. Arkharov, Z. P. Kichigina, A. A. Spiridonov, Inst Phys of Metals, Ural Affiliate, Acad Sci USSR, and Ural Polytech Inst

"Dok Ak Nauk SSSR" Vol LXXVIII, No 4, pp 673-676

Several assumptions on subject are as follows: Residual austenite formed in the surface layer of steel is additionally alloyed with certain elements from electrode material and from surrounding medium, e.g., with nitrogen from air. This causes higher stability of austenite and

184T41

USSR/Engineering - Tools, Spark Cutting 1 Jun 51 (Contd)

hampers its decompn at elevated temp during cutting process. Due to these features of austenite, martensite, result of transformation of austenite during cutting, has hardness higher than that of martensite obtained by ordinary heat treatment of steel, of which cutting tool is made. There is definite connection between conditions of cutting process and conditions of spark working on the tool. Conducted expts to study influence of cutting conditions on durability of tool strengthened by elec spark working. Submitted by Acad I. P. Bardin 9 Apr 51

184T41

ARKHAROV, V. I.

Width of zones of inter-crystallite internal adsorption; Criticism; S. M. Vinarov. Reply; V. I. Arkharov
Zhur. tekh. fiz. 22 No. 2, February 1952

SO: MLRA. August 1952.

AEKHAROV,

Thermal Fatigue of Single Crystals of Aluminum. [illegible]
[illegible]

Ural State [illegible] Gorky [illegible]

USSR/Metals - Titanium, Oxidation Apr 52

"On the Role of Nitrogen in the Process of High-Temperature Oxidation of Titanium in the Air," V. I. Arkharov, G. P. Luchkin, Inst of the Phys of Metals, Ural Affiliate, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol LXXXIII, No 6, pp 837-839

Describes X-ray expts explaining why oxidation of titanium at temp over 1,150° in the air is more intensive than oxidation in oxygen. Precision measurements of lattice consts of basic oxide phase in titanium scale, rutile, revealed difference in their values for these 2 cases of oxidation due to factor

223T49

that N of the air enters rutile lattice in form of trivalent ions N3- substituting for O2- ions. Submitted by Acad I. P. Bardin 18 Feb 52.

223T49

ARKHAROV, V. I.

1. ARKHAROV, V. I.; VARSHAVA, A. N.; ZHURAVLEVA, M. G.; CHUFAROV, I. G.

2. USSR (600)

4. Oxides

7. Reduction of mixtures of magnetic ferric oxide with nickelous oxide and cobaltous oxide. Dokl. AN SSSR 87, No. 1, 1952

9. Monthly List of Russian Accessions, Library of Congress, February, 1953. Unclassified.

ARKHAROV, V. I.

Structural x-ray analysis in the metal industry. V. I. Arkharov. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 17, 145–55(1953).—The possibilities and limitations of the following applications of x-ray analysis are critically evaluated: (1) qual. and quant. analysis of phases and concns. of solid solns.; (2) texture and crystallite orientation; (3) size and shape of crystals; (4) tensions and elastic strains (3 types); (5) analysis of fine structure and nonequil. characteristics; (6) mosaic structure; (7) microanalysis. The qual. and quant. analysis is limited by min. amts. of phase necessary for identification; for example, 1% Co in a Co + WC_2 mech. mixt. is observable, but after sintering only 10% Co can be detected. An error in concn. detn. (from parameter changes) can vary, for example, by 0.04% for AgCu and 0.22% for CuNi. The investigation of strains of the 3rd kind (deviations of atom positions from the nodes of an ideal lattice) as a function of temp. and stress is very fruitful in the study of subcryst. structure, pretransition states near order groupings, etc. The following practical applications of x-ray analysis are considered as promising: (A) study of metal slugs (transcrystn. and surface-active impurities, dendritic liquations, mosaic structure and addns., interstitial H_2 content); (B) hot and cold mech. treatment and its influence on structure and strains; (C) study of the aging of alloys; (D) influence of cutting (especially high-speed cutting) on metal structure; (E) study of corrosion protective coatings; (F) control of powder metallurgy production; (G) analysis of ores and refractories.

S. Paksuer

C.A. V-48
Jan 10, 1954
Metallurgy & Metallography

Inst. Physics of Metals, Ural Affil, AS USSR

ARKHAROV, V. I.

Metallurgical Abst.
Vol. 21
May 1954
Properties of Metals

(CA 47 no. 22:12172 '53)

4
(13)

Thermal Fatigue of Single Crystals of Aluminium. V. I. Arkharov, S. I. Ignatyeva, and Yu. D. Kozmanov (*Doklady Akad. Nauk S.S.S.R.*, 1953, 88, (3), 439–440).—[In Russian.] Cycling of single crystals of Al between 300°, 400°, 500°, or 600° C. and 15° C. (by quenching) results in changes in the form of the Laue spots on X-ray-diffraction photographs. Experiments on crystals of decreasing dia. show the beginning of the changes in the spots at an increasing number of cycles, thus indicating that the X-ray changes result from plastic deformation induced by temp. gradients. It is concluded that thermal fatigue is caused by temp. gradients and that the [illegible] of the fatigue depends on the mosaic structure. (Translated by the U.S. National Science Foundation (NSF-tr-3)).—D. M. P.

1. V.I. ARKHAROV, S. G. IGNAT'EVA, IU D. KOZMANOV
2. USSR (600)
4. Aluminum
7. Origin of aluminous minerals in bauxitic rocks. Dokl. AN SSSR 88 no. 3. 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

ARKHAROV, V. I.

USSR/Metallurgy - Iron, Diffusion

Mar 53

"Frontal Diffusion in Commercial Iron," V.I. Arkharov, K.A. Yefremova, S.I. Ivanovskaya, A.K. Shtol'ts, B.A. Yunikov; Inst of the Phys of Metals, Ural Affil, Acad Sci USSR

DAN SSSR, Vol 89, No 2, pp 269-270

Studies diffusion of number of elements, such as Ni, Pd, Cu, Cr, into Fe and effect of admixts on diffusion rate. In case of Cr and Al, diffusion zone is uniform in width and has even front line. But in diffusion of Ni, Pd, and Cu, front of diffusion zone had protuberances, showing tendency of element to prefer diffusion along intercryst boundaries. This tendency is shown to lesser extent when Fe has small contents of Ti, Nb, Mo and B. Diffusion of Ag in alloy of Fe with Pd is also discussed. Several photomicrographs are given. Presented by Acad I.P. Bardin 12 Jan 53.

B.T.R. Vol. 3, No. 4
Apr. 54

Source #264T50

ARKHAROV, V. I.

Metallurgical Abst.
Vol. 21 May 1954
Properties of Metals

B.T.R. Vol. 3, No. 4
Apr. 54

(3)

*On the Effect of Certain Dissolved Elements on the Frontal Diffusion of Silver into Polycrystalline Copper. V. I. Arkharov, S. I. Ivanovskaya, and N. N. Skornyakov (*Doklady Akad. Nauk S.S.S.R.*, 1953, 89, (3), 469-472).—[In Russian]. The effects on the diffusion of Ag of the presence of high concentrations of Be, Sb, or Fe in the grain boundaries of Cu (even though the overall concentration of the addn. elements is low) were studied metallographically. Be retards the diffusion in the grain boundaries, but the effect is masked by the diffusion within the grains, and the diffusion zone is smaller than that for pure Cu. Sb and Fe accelerate diffusion and cause penetration along the grain boundaries, which is more intense in the case of Fe. The effects of varying mixtures of the three addn. elements were studied, and it was shown that in all cases one of the elements had a predominant effect. (Translated by the U.S. National Science Foundation (NSF-tr-58)).—D. M. P.

Inst. Physics of Metals, Ural Affil, AS USSR

Changes in the lattice parameter of polycrystalline solid solutions and intercrystalline internal adsorption. Arkharov and N. N. Skoruvakov. *Doklady Akad. Nauk S.S.S.R.* 89, 841–4(1953)(Engl. translation issued as *U.S. Atomic Energy Com.*, NSF-tr-96, 5 pp.(1953)).—Intercryst. internal adsorption (IIA) in polycryst. alloys of Cu contg. Sb, Be, and Fe was studied by measuring the lattice const. as a function of grain size. Cu-Sb alloys in the coarse-grained state have a larger lattice const. than in the fine-grained state. The results show that the concn. of Sb within the grains decreases with reduction in grain size. When the total vol. of the intercryst. transition zones increases, the amt. of Sb in these zones increases. Thus Sb in Cu has pos. IIA. With Cu-Be alloys the change in lattice const. with grain size is opposite to that in Cu-Sb alloys. Since Be reduces the lattice const. of Cu, Be in Cu also has pos. IIA. The IIA of Fe in Cu cannot be observed directly because of the small effect of Fe on the lattice const. of Cu. The pos. IIA of Fe in Cu was demonstrated by use of ternary alloys. The thickness of the intercryst. transition zones was estd. at 350–900 A. for the various alloys. D. T. C.

Evaluation B 76505

4

9/18/54

1. ARKHAROV, V.I.; VARSKOY, B.N.; SKORNYAKOV, N.N.

2. USSR (600)

4. Alloys

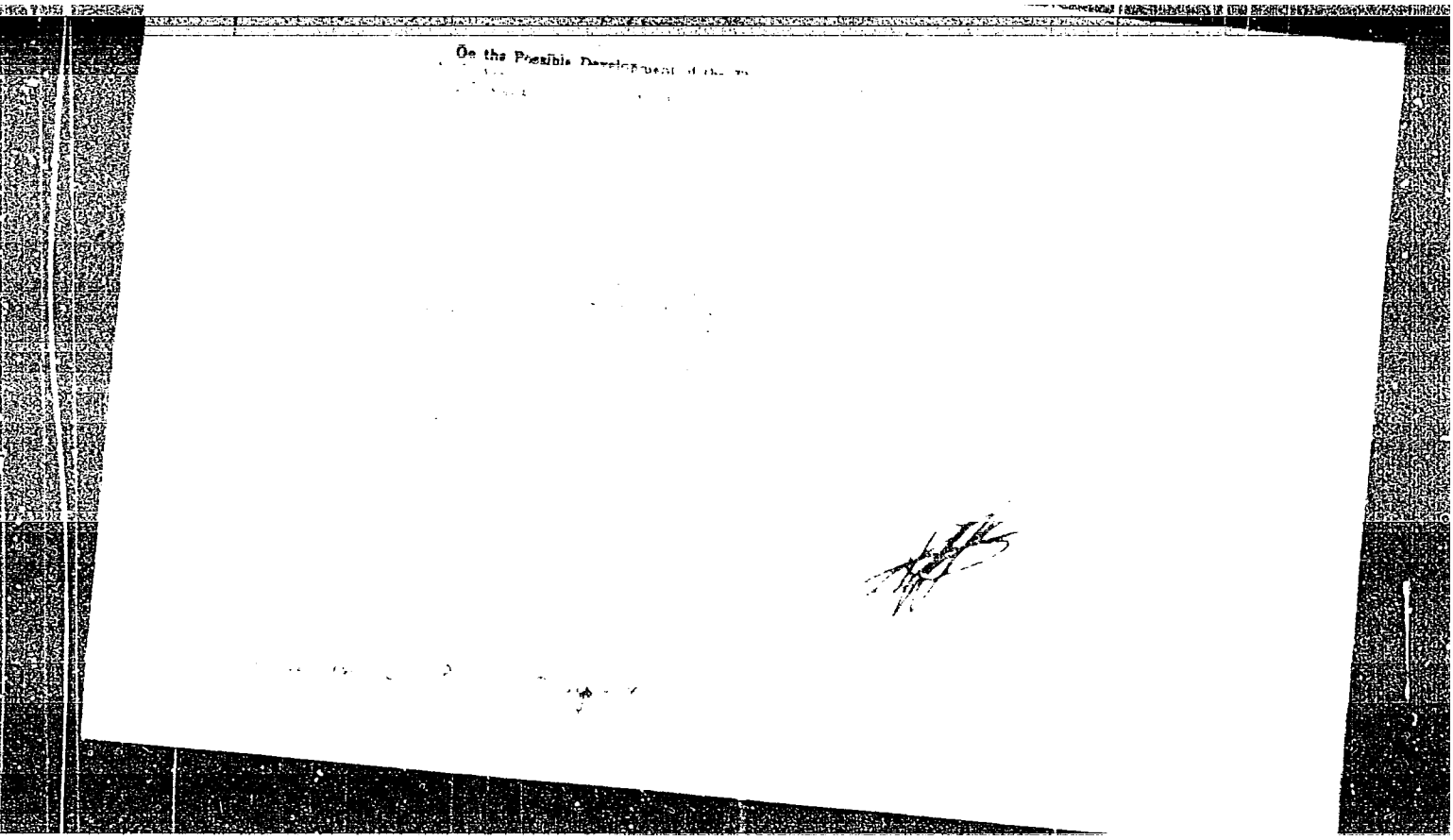
7. Causes of the effect of small dissolved additions on the kinetics of alloy aging, V.I. Arkharov, B.N. Varskoy, N.N. Skorniakov, Dokl. AN SSSR 89 no. 6, 1953. Inst of Physics of Metals, Ural Affiliate, Acad Sci USSR.

Ø. 1003-6

Investigates accelerating effect of Sb on aging of Cu-Ag alloys and similar effect of Ag and Zn on aging process in Al-base 4% Cu-alloy. Concludes that acceleration of aging process in all cases is attributed to internal adsorption of small additions. X-ray method for studying changes in alloys was used in investigations. Presented by Acad I.P.Bardin 12 Jan 53.

259T20

9. Monthly List of Russian Accessions, Library of Congress, APRIL 1953. Unclassified.



Arkharov, V. I.

CH

Intercrystalline internal adsorption in polycrystalline solid solutions. V. I. Arkharov. *Trudy Inst. Fiz. Metal., Akad. Nauk S.S.S.R., Ural. Filial* 34, 16–25(1954).—Elements that tend to accumulate preferentially in the intercryst transition zone of unsatd solid solns are defined as "horophilic" and those that accumulate in the crystallite are called "horophobic." Horophilic elements present in small quantities, i.e. less than the solid soly. at room temp., accumulate in the intercryst. zone at elevated temps up to the soly. at that temp. Upon slow cooling, these elements diffuse into the crystallites, but during fast cooling they are pptd. in the intercryst. zone as a sep. phase and may produce a brittle structure. This behavior explains why steels apparently identical in analysis and microstructure may differ in mech. properties and accounts for such phenomena as temper brittleness (C. A. 44, 6308i), stony fracture of steel, peculiarities of carbide segregation of steel, and modification and aging of alloys. Experl. data supporting the hypotheses are given.

H. W. Rathmann

USSR/Physics - Activation Energy

FD 359

Card 1/1

Author : Arkharov, V. I.

Title : Clarification of the concept of "activation energy" and "elementary act" for the solid state of substances

Periodical : Zhur. tekh. fiz. 24, 375-387, Mar 1954

Abstract : Attempts to give more accurate expression to characteristics of molecular-kinetic processes in solid phase. Considers a greater accuracy as indispensable for analysis of such processes in which temperature dependence of reaction rate may be represented on semi-log graph by a straight line.

Institution :

Submitted : June 23, 1953

USSR/Metals - Iron scale texture

Card 1/1 : Pub. 153 - 9/18 FD-439

Author : Arkharov, V. I.; Blankova, Ye. B.; and Simonova, M. I.

Title : Texture of iron scale. VI: Variations in texture when the air is replaced by atmospheres of lowered oxygen pressure

Periodical : Zhur. tekh. fiz. 24, 677-685, Apr 1954

Abstract : Investigate the structural changes in the iron scale for initial oxidation in air, for water vapor, and for the cases where the air is replaced by a water vapor-hydrogen atmosphere and by a pure hydrogen atmosphere respectively.

Institution : —

Submitted : June 27, 1953

ARKHAROV, V. I.

USSR/Physics - Decomposition of Ag and Cu

Card 1/1 Pub. 153-10/26 FD-901

Author : Arkharov, V. I. and Polikarpova, I. P.

Title : Effect of small admixtures of iron on decomposition of super saturated solid solutions of silver in copper

Periodical : Zhur. tekh. fiz. 24, 1244-1246, Jul 1954

Abstract : A small admixture of iron accelerates the decomposition of a solid solution of Ag and Cu. This effect is particularly strong at temperatures of 400 to 500° with short exposure; thereafter the effect levels out. Taking into consideration that the presence of Fe does not affect the solubility of Ag and Cu, the authors assume that the accelerating effect of Fe admixture on the decomposition of the solid Ag-Cu solution is caused by internal adsorption. Seven references.

Institution : --

Submitted : December 15, 1953

No illustration —

USSR/Physics - Solubility of Ag-Cu ARKHAROV, V. I. FD-902

Card 1/1 Pub 153-11/26

Author : Arkharov, V. I., Vangegeym, S. D., Magat, L. M. and Polikarpova, I. P.

Title : Solubility of silver and copper in presence of small admixtures of beryllium or iron

Periodical : Zhur. tekh. fiz. 24, 1247-1253, Jul 1954

Abstract : Study lattice parameters of solid solutions of various composition using x-ray techniques. Results confirm former assumptions on the mechanism governing the effect of admixtures on kinetics of aging. Kinetics are based on internal adsorption of admixtures. Five references Arkharov et al. Tables; graphs.

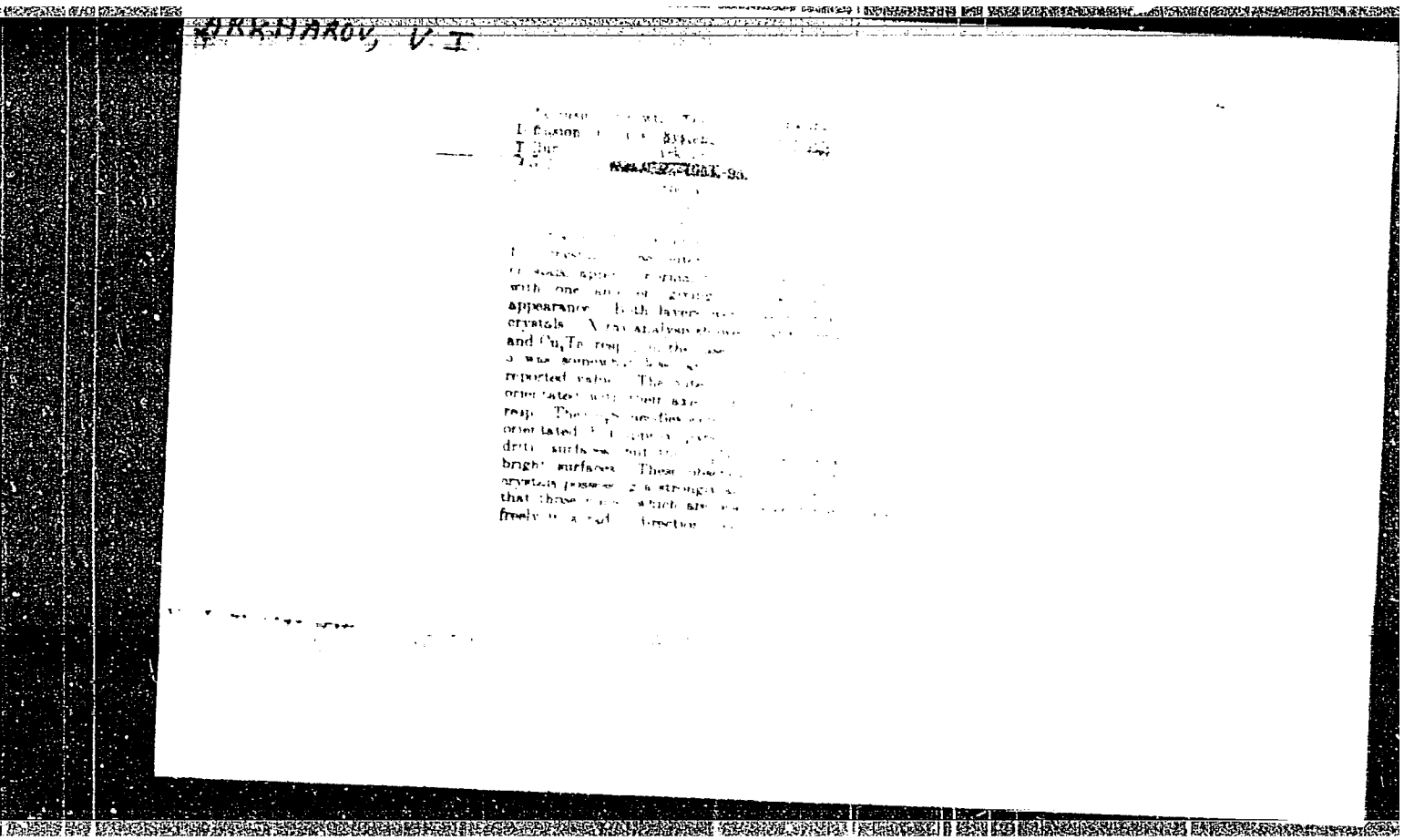
Institution : --

Submitted : December 15, 1953

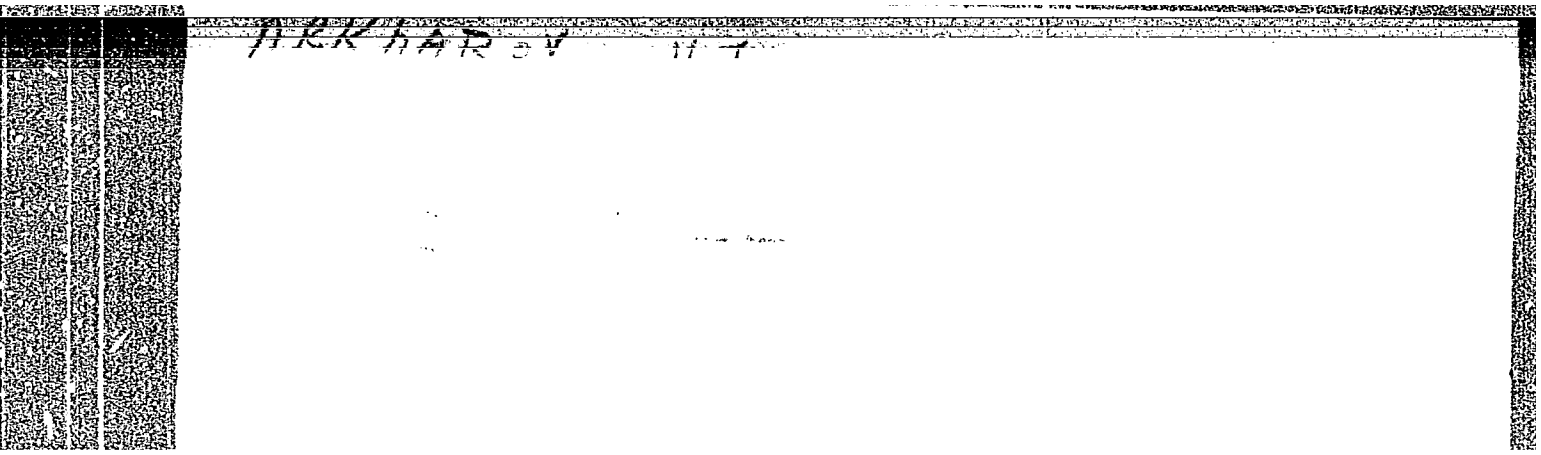
ARKHAROV, V.I.

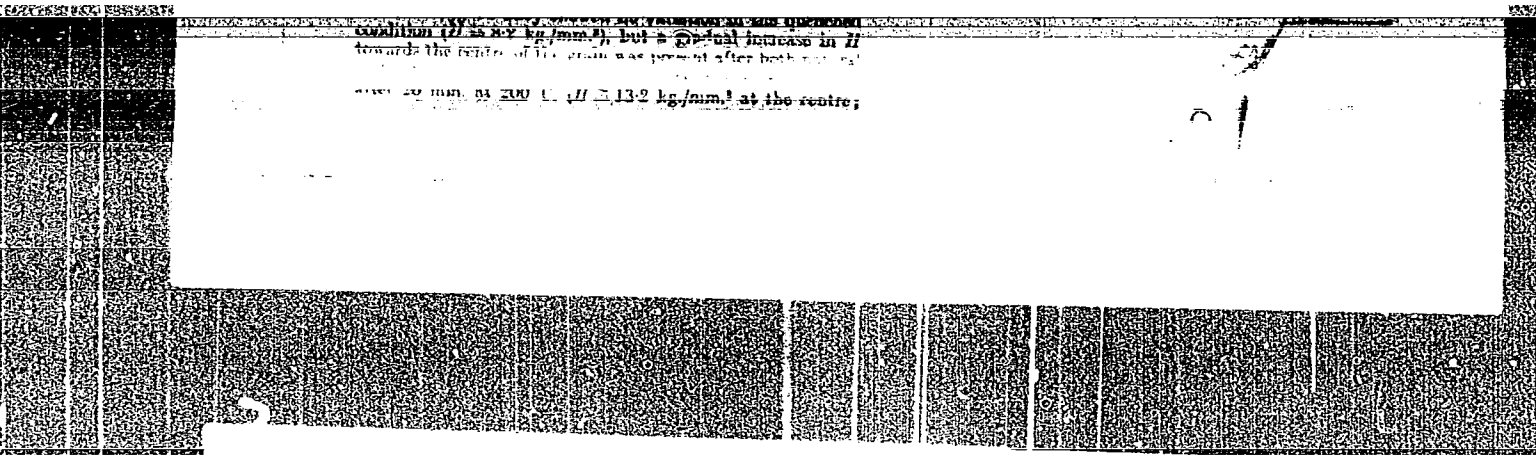
*Diffusion of Silver into Iron Palladium Alloys and Internal Adsorption of Palladium in Iron. V. I. Arkharov and B. A. Yunikov. *Doklady Akad. Nauk S.S.S.R.*, [illegible] 1057-1060; (In Russian). The diffusion of Ag into Fe [illegible] [illegible] of the [illegible] Pd was at [illegible]

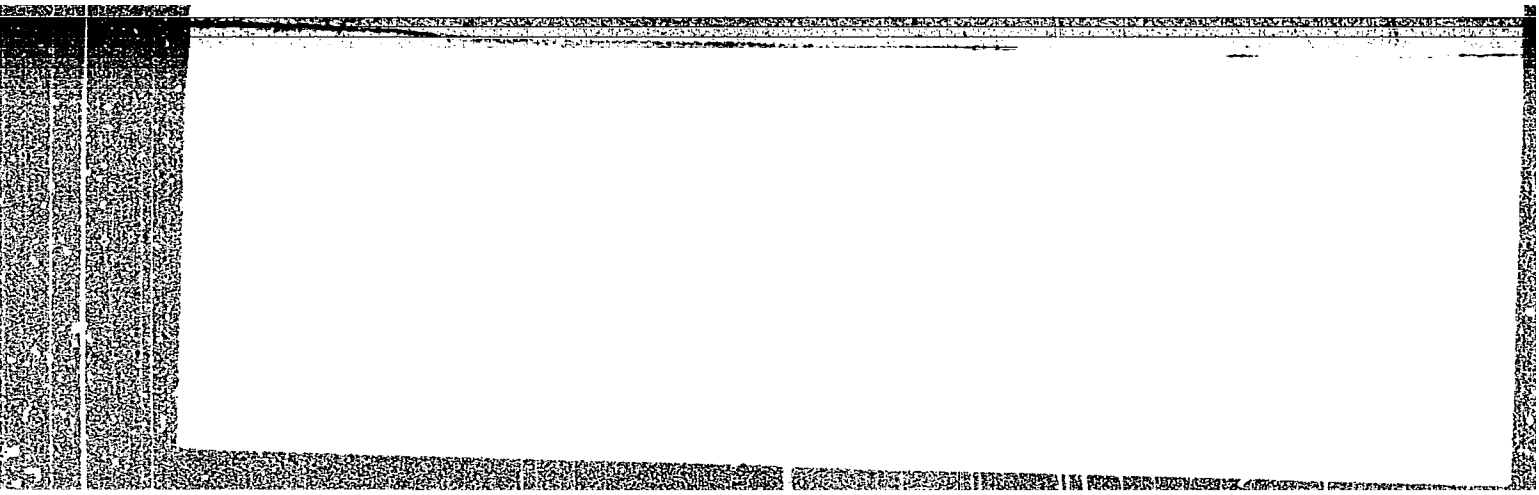
[illegible] The width of the veins by which the diffusion of Ag proceeded in alloys poor in Pd was found to be substantially greater than the thickness of the intercryst.



KRASNAROV, V. I.







APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000102110006-0"

Arkharov, V. I.

Category: USSR

B-9

Abs Jour: Zh--Kh, No 3, 1957, 7559

Author : Arkharov, V. I. and Mardeshev, S.
Inst : Not given
Title : Radiographic I..vestigation of Active Diffusion in the Cu-S System

Orig Pub: Fiz. Metallov i Metallovedeniye, 1955, Vol 1, No 2, 273-280

Abstract: The reaction between Cu and S vapors in vacuum at 20-600° has been investigated radiographically. Above 300° the surface of Cu is covered by a scale consisting of an external dense layer of CuS (having a growth structure of the CuS (110) type parallel to the external surface of the sample), an intermediate dense layer of Cu_2S strongly bonded to the CuS layer, and an internal porous amorphous layer of Cu_2S. A more or less pronounced gap is formed between the scale and the Cu surface. The completeness of the structure of the external layer decreases as the temperature is lowered

Card : 1/2

Arkharov, V. I.

Category: USSR

B-9

Abs Jour: Zh--Kh, No 3, 1957, 7560

Author : Arkharov, V. I. and Mardeshev. S.
Inst : Not given
Title : Radiographic Investigation of Active Diffusion in the Cu-Se and Cu-Te Systems

Orig Pub: Fiz. Metallov i Metallovedeniye, 1955, Vol 1, No 2, 281-285

Abstract: The products of the reaction between Cu and Se in vacuum at 350-500° and Cu and Te at 600° have been investigated radiographically. The reaction products consist of Cu_2Se and Cu_2Te, respectively. The layer immediately adjoining the Cu surface consists of porous randomly oriented crystals, weakly bonded to the Cu. In isolated regions of this layer there is observed the development of large needle-like Cu_2Se (110) and Cu_2Te (010)

Card : 1/2

Category: USSR

B-9

Abs Jour: Zh--Kh. No 3, 1957, 7560

crystals perpendicular to the exterior surface of the sample. It is shown that the needle-like structure results from the strongly anisotropic growth rate of the Cu_2Se and Cu_2Te crystals and the markedly preponderant diffusion of Cu. The direction of maximum growth in Cu_2Se is (110) and in Cu_2Te (010). A comparison with the results from the investigation of diffusion in the systems Cu-O (Arkharov, V. I. and Voroshilova, Z. A., Zh, tekhn. fiziki, 1935, Vol 5, 1625; Arkharov, V. I. and Kichigina, Z. P., Zh, fiziki, 1948, Vol 18, 215) and Cu-S (see preceding abstract) shows that the relative importance of Cu diffusion increases with increasing atomic weight of the metalloid, whereas the importance of metalloid diffusion decreases.

Card : 2/2

ARKHAROV, V.I.

More about the concept "Activation energy" for the solid state of matter. Fiz.met. i metalloved. 1 no.2:384 '55. (MLRA 9:4)

1. Ural'skiy filial Akademii nauk SSSR, Institut fiziki metallov.
(Entropy) (Solids)

АРХАРОВ, В. И.

USSR/Physical Chemistry - Crystals, B-5

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 209

Author: Arkharov, V. I., and Mardeshev, S.

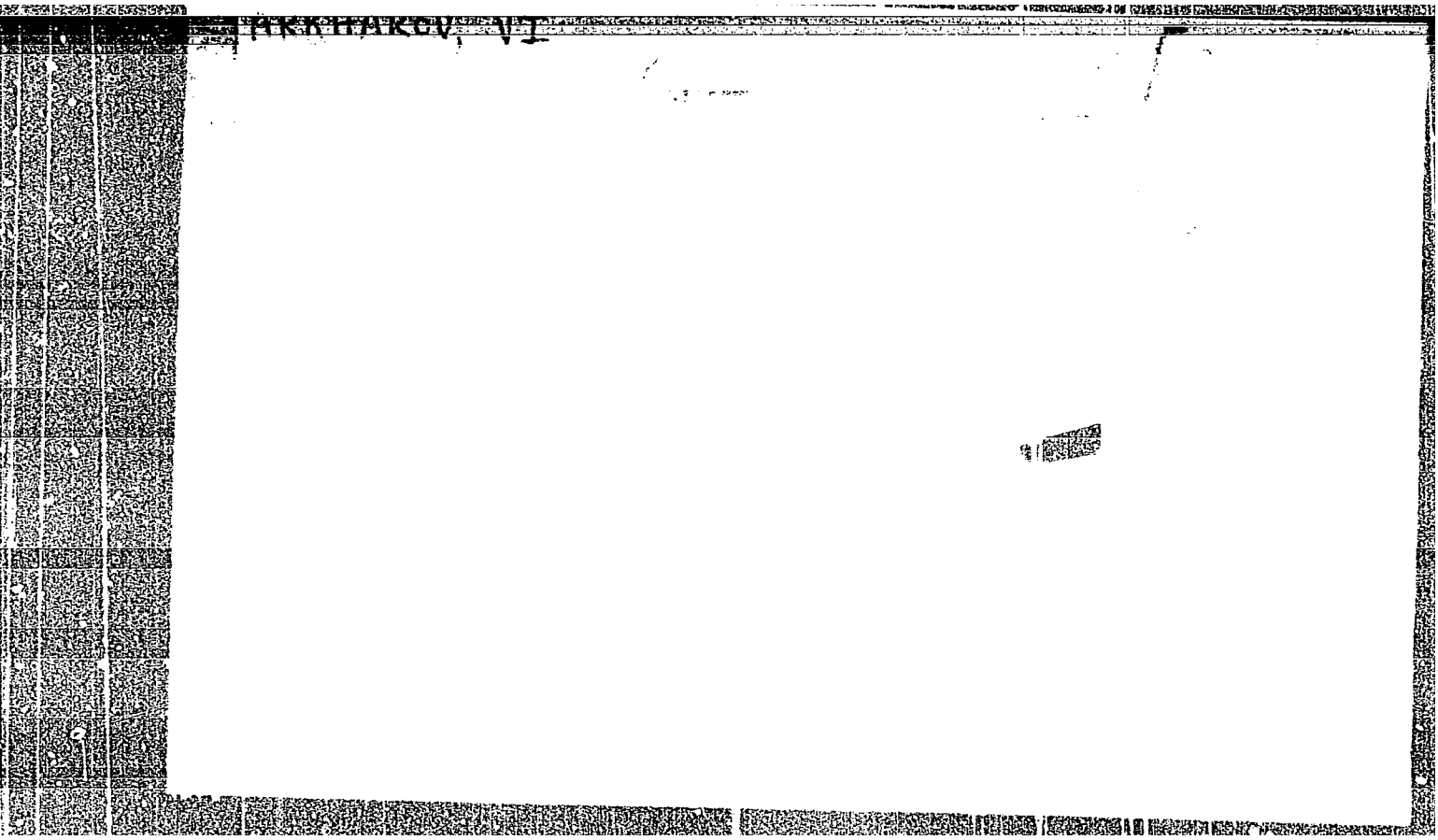
Institution: None Inst. Physics of Metals, Ural Affil AS USSR

Title: X-Ray Investigation of Reactive Diffusion in Binary Systems Formed by Copper with Halogens, Phosphorus, and Silicone

Original Periodical: Fiz. metallov i metallovedeniye, 1955, Vol 1, No 3, 510-516

Abstract: None

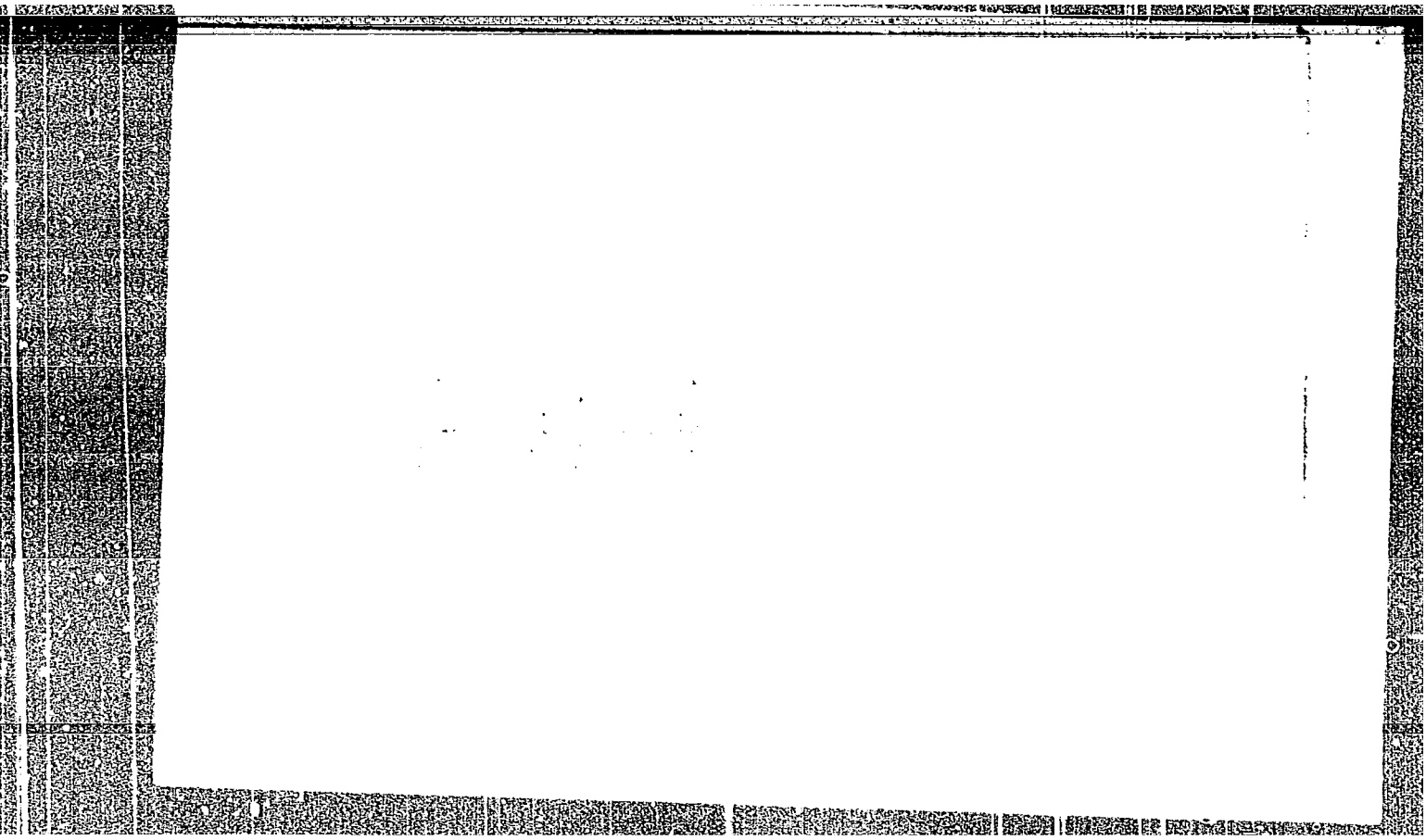
Card 1/1



ARKHAROV V.I.

USSR.

Significance of structural studies of metallurgic and physicochemical processes based on reactional diffusion in solid phases. V. I. Arkharov and S. Mardeshev. *Vestnik Akad. Nauk Kazakh. S.S.R.* 11, No. 5 (Whole No. 122), 10-20(1955).—Review of existing material on diffusion in solids as related to the problems of metallurgy (cf. *C.A.* 49, 8720h). Results of diffusion studies on systems of Cu with gas phases contg. Cl, Br, I, S, Se, Te, P, Si, and Zn are discussed. With halogens the diffusion of Cu is most important, the reverse diffusion is significant only in the Cu-Cl system. This is caused by the large ionic dimensions of the higher halogens. In systems of Cu with O, S, or Se, the main factor again is the diffusion of Cu, although some O diffusion is significant. In systems of Cu with P or Si the diffusion of both components is important. The system Cu-Zn is a special case of complex nature caused by nearly equal diffusivity of both components. G. M. Kosolapoff



APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000102110006-0"

ARKHAROV, V.I.

Link between the macro- and microscopic representation of disintegration in solid solutions. Trudy Inst. fiz.met. no.16:26-39 '55.
(Solutions, Solid) (Metallography)
(MLRA 9:2)

ARKHAROV, V.I.

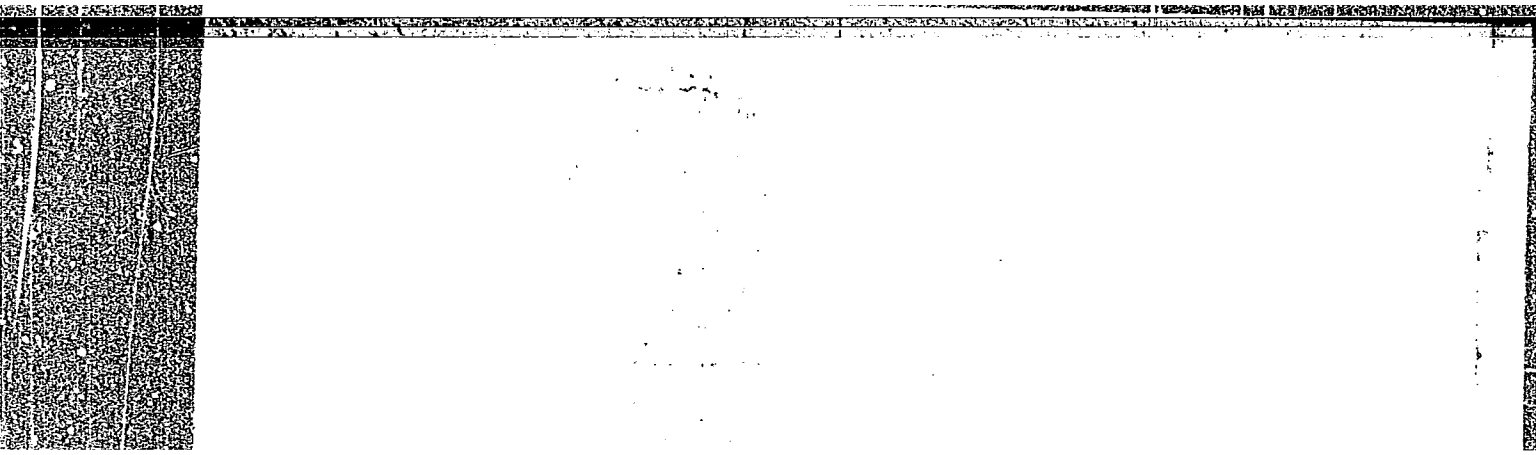
Clarifying the concepts "Activation energy" and "Elementary act" used in connection with the solid state of matter. Trudy Inst. fiz.met. no.16:40-52 '55. (MLRA 9:2)
(Diffusion) (Physical metallurgy--Terminology)

ARKHAROV, V. I. and IVANOVSKAYA, S. I.

"Simple method of research on diffusion in solid metals", appearing in the "Works of the Institute on the Physics of Metals, Issue 16, Collection of Research Papers on Diffusion and Internal Adsorption in Metals and Alloys", (Trudy Instituta Fiziki Metallov, vypusk 16, Sbornik Rabot Po Issledvaniyu Diffuzii I Vrutrennei Adsorbtsii V Metallakh I Splavakh), published by Ural Branch of the Academy of Science USSR, p 53, 1955.

ARKHAROV, V. I. and YEFREMOVA, K. A.

"Concerning the diffusion front form during the diffusion of nickle and other elements in iron and the influence of small admixtures solutions on it", appearing in the "Works of the Institute on the Physics of Metals, Issue 16, Collection of Research Papers on Diffusion and Internal Adsorption in Metals and Alloys", (Trudy Instituta Fiziki Metallov, vypusk 16, Sbornik Rabot Po Issledovaniyu Diffuzii I Vrutrennei Adsorbtsii V Metallakh I Splavakh), published by Ural Branch ofthe Academy of Science USSR, p 56, 1955.



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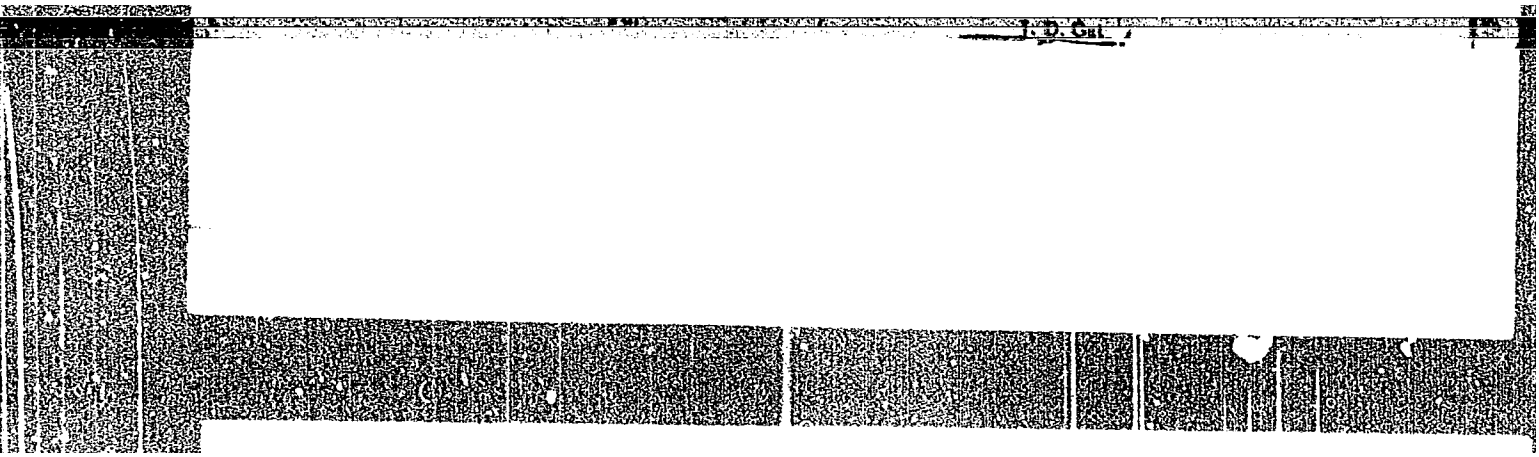

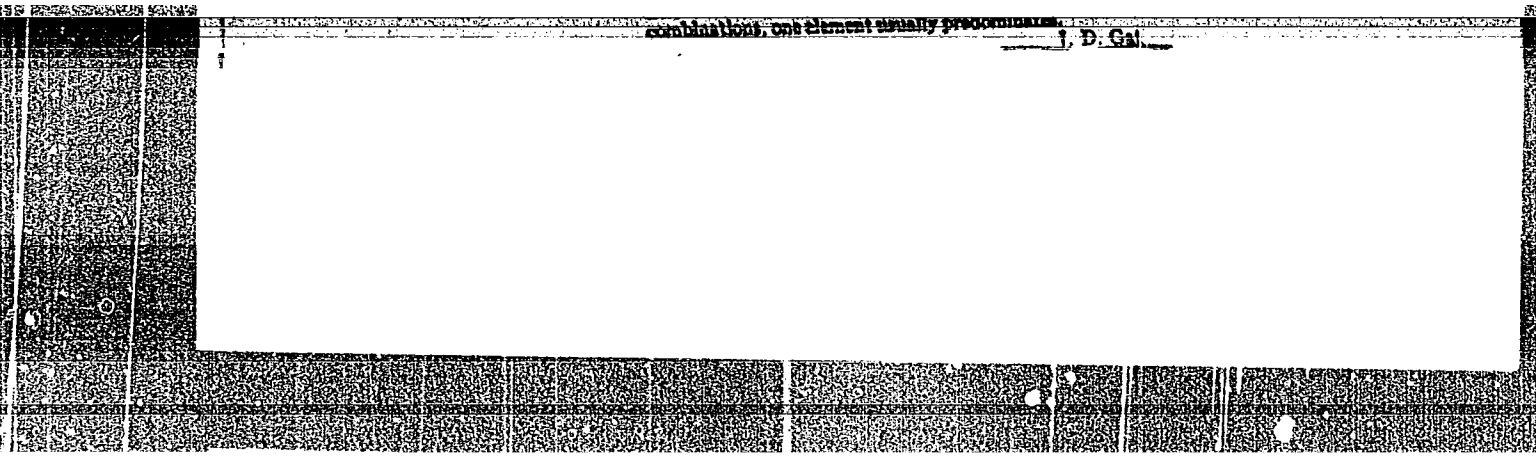

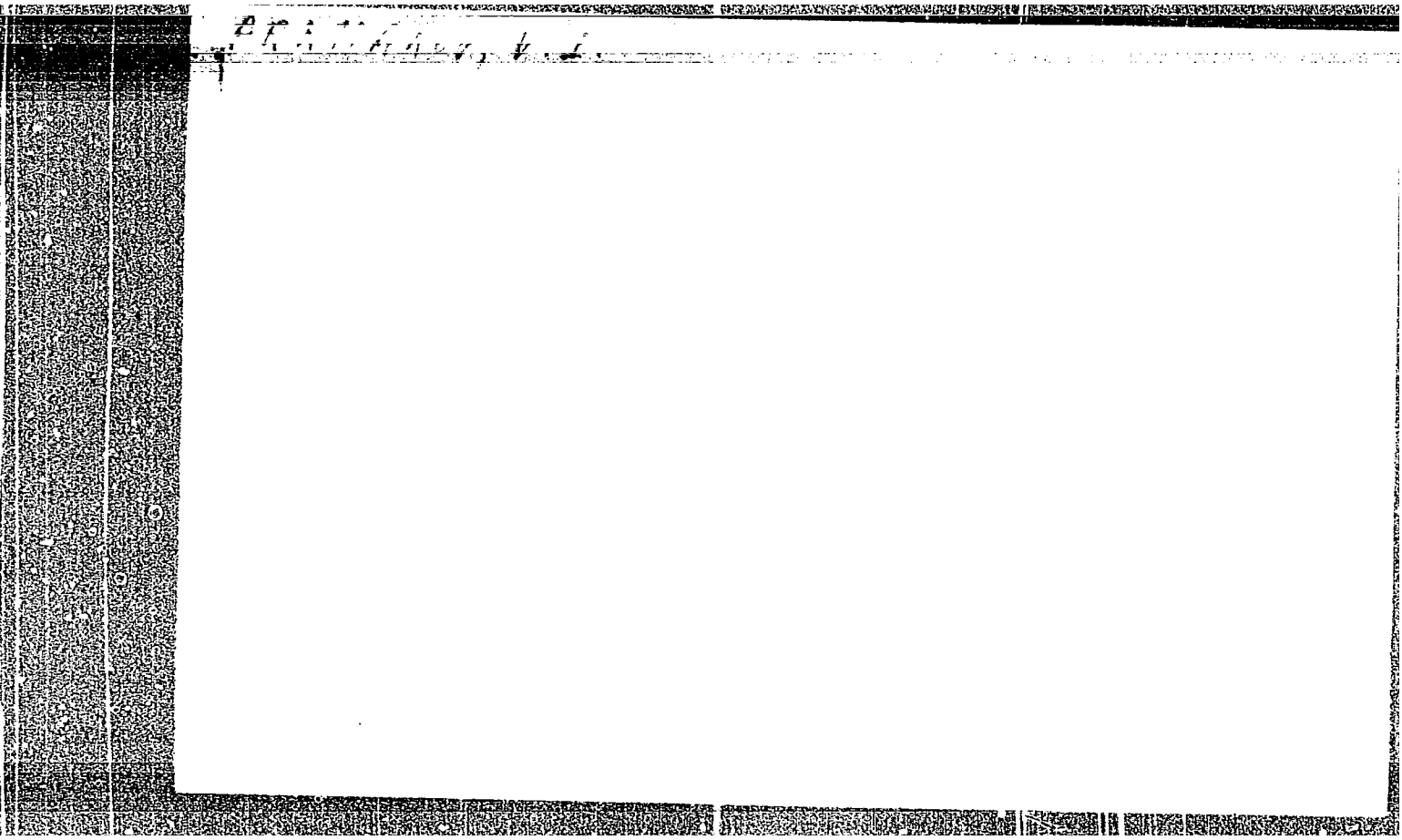

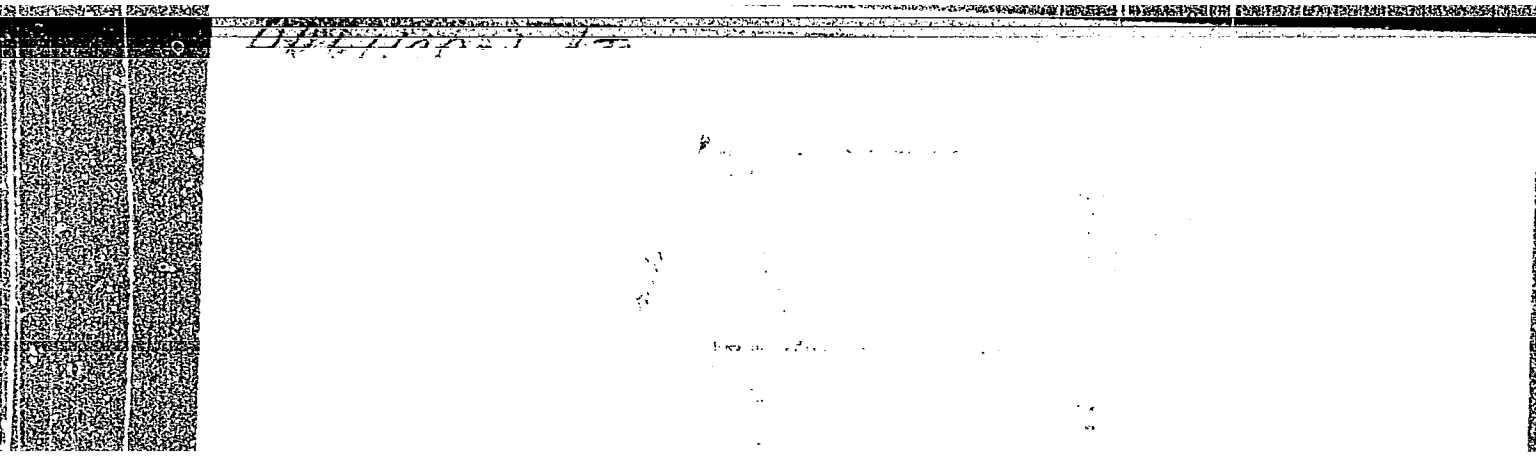

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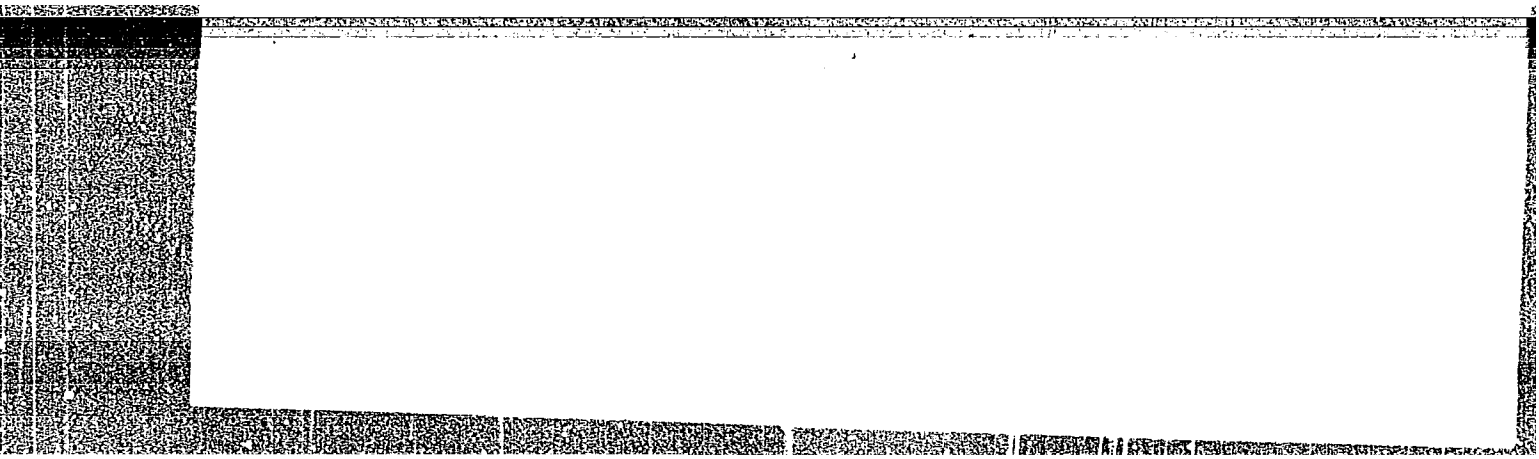

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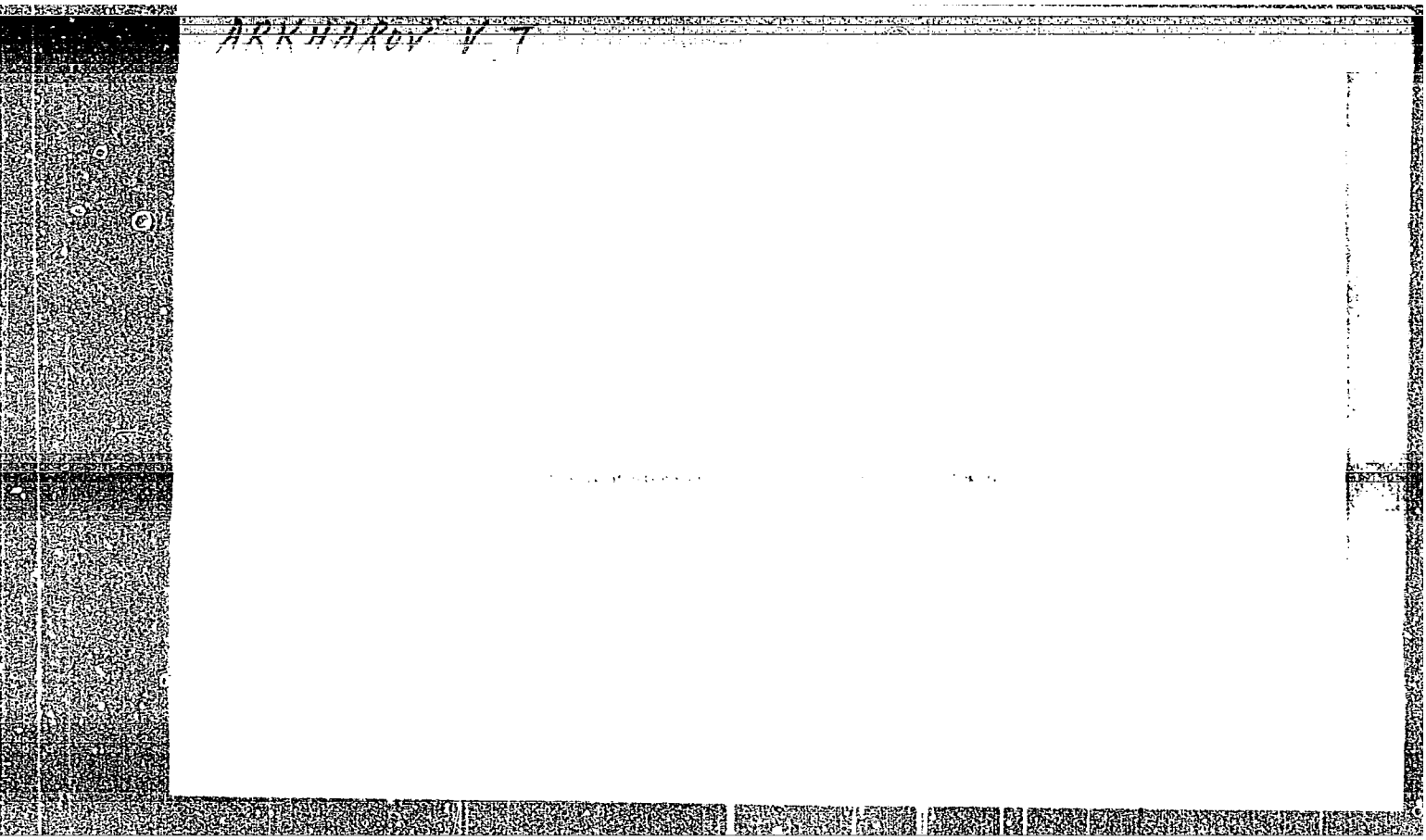
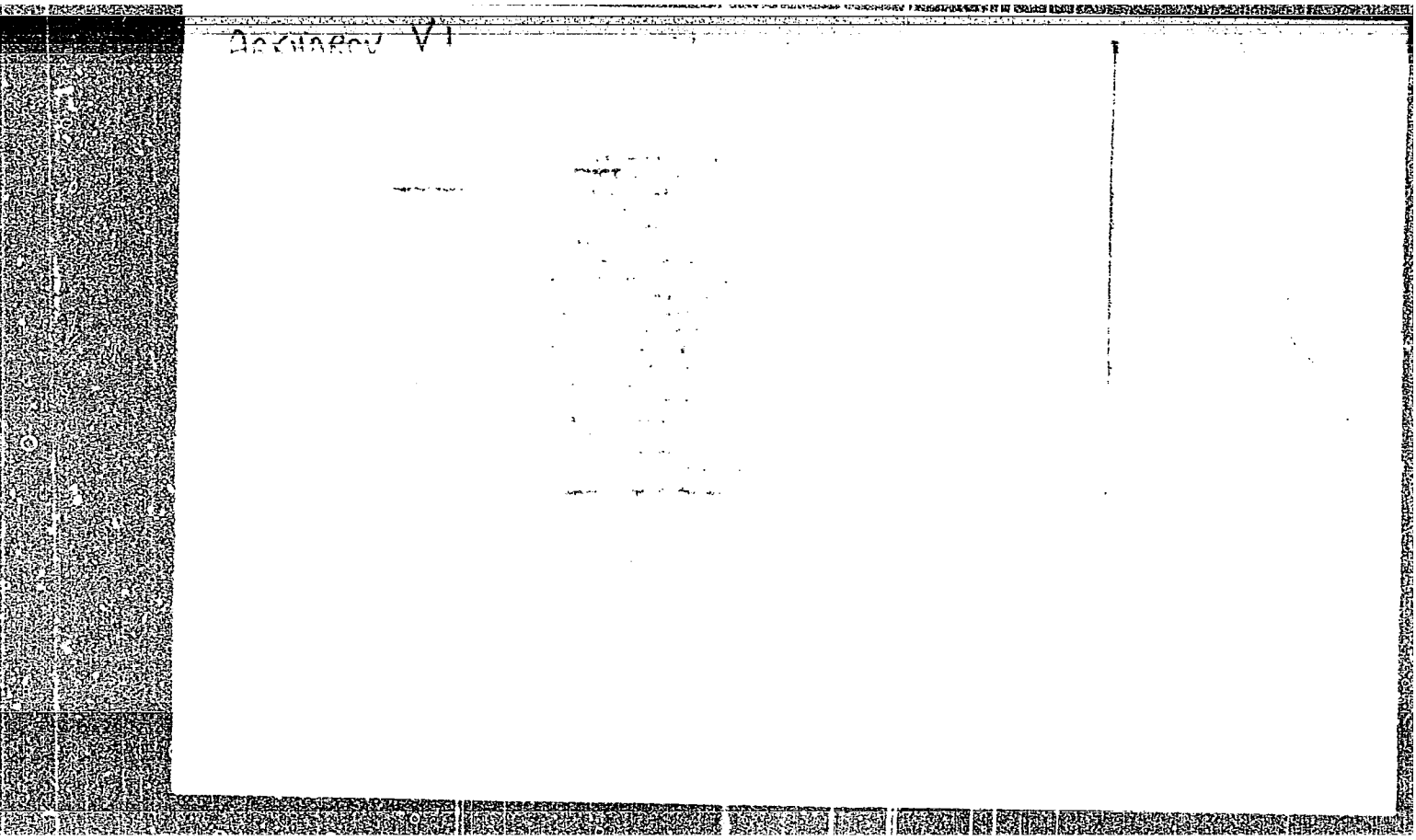


ARKHAROV, V. I. and LUCHKIN, G. P.

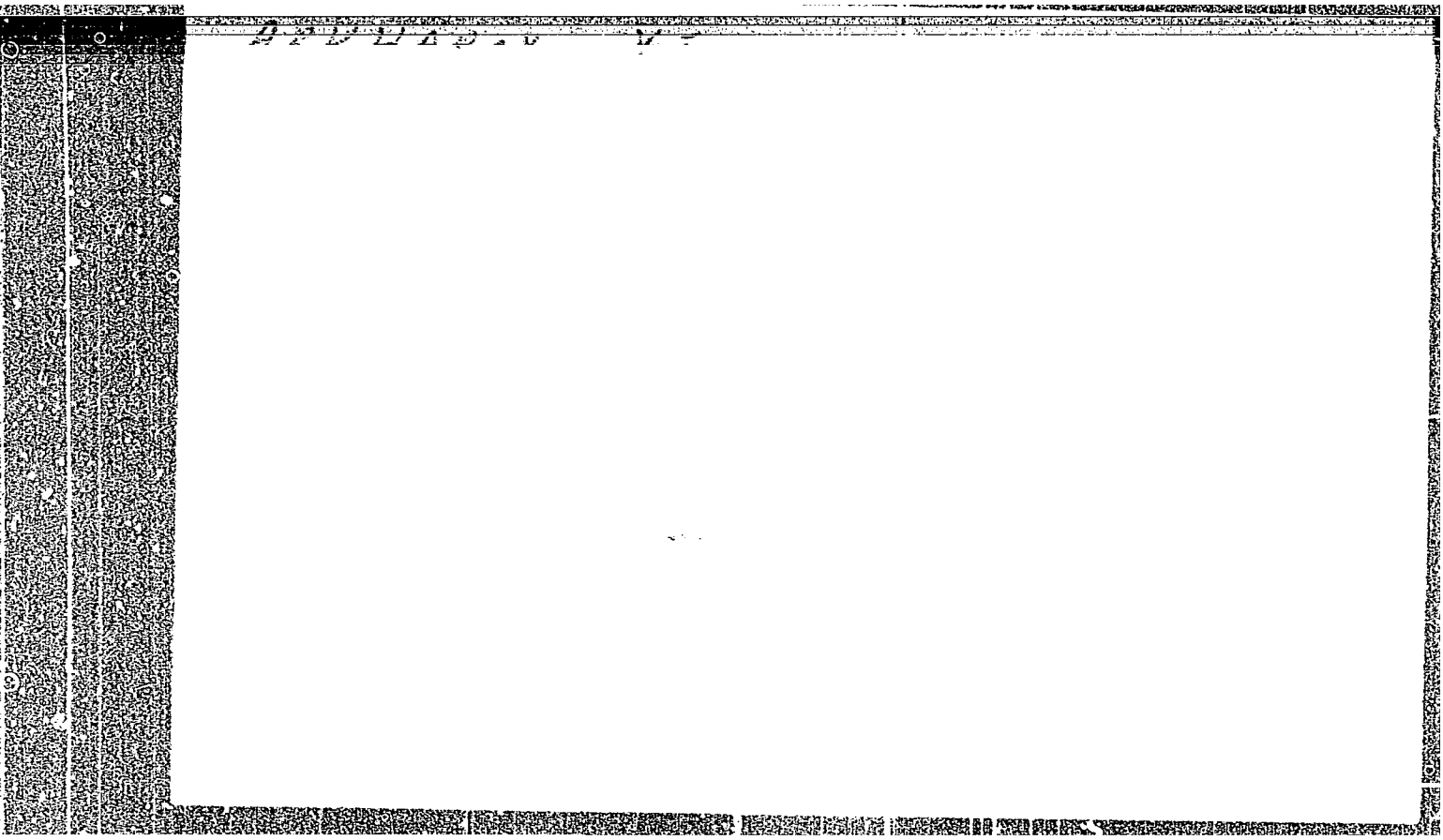
"X-ray research on the high-temperature oxidation of titanium and its alloys with iron", appearing in the "Works of theInstitute on the Physics of Metals, Issue 16, Collection of Research Papers on Diffusion and Internal Adsorption in Metals and Alloys", (Trudy Instituta Fiziki Metallov, vypusk 16, Sbornik Rabot Po Issledovaniyu Diffuzii I Vrutrennei Adsorbtsii V Metallakh I Splavakh), published by Ural Branch of the Academy of Science USSR, p 101, 1955.



ARKHAROV, V.I.; BOGOSLAVSKIY, V.N.; ZHURAVLEVA, M.G.; CHUFAROV, G.I.

Study of the reduction of iron oxides with graphite. Zhur.fiz.khim. 29 no.2:272-279 F '55. (MIRA 8:7)

1. Ural'skiy filial Akademii nauk SSSR, Institut khimii i metallurgii, Sverdlovsk. (Reduction, Chemical) (Iron oxides)



ARKHAROV, V. I.

USSR/Chemistry - Physical chemistry

Card 1/1 Pub. 22 - 27/45

Authors : Arkharov, V. I., and Mardeshev, Sabir

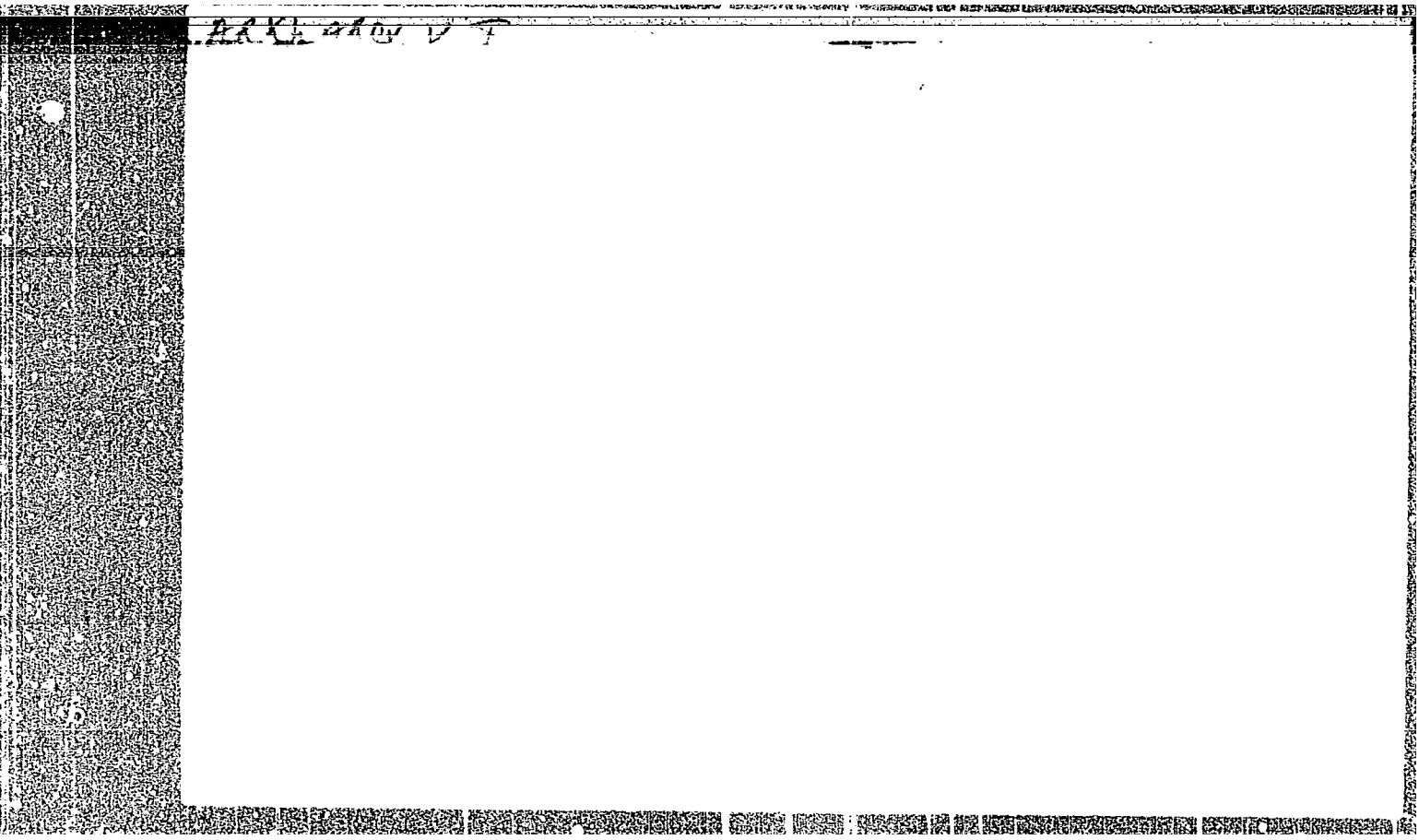
Title : Mechanism of reaction diffusion during reaction of solid Cu with certain gaseous elements

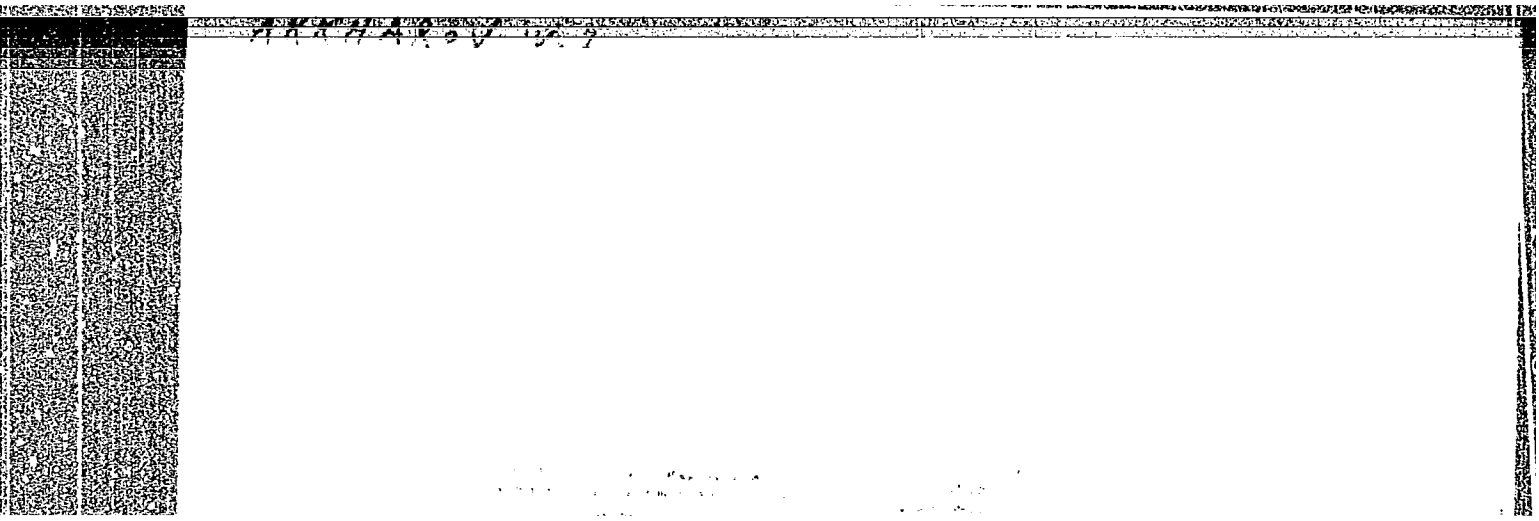
Periodical : Dok. AN SSSR 103/2, 273-276, Jul 11, 1955

Abstract : The mechanism of reaction diffusion was investigated in binary systems made up of solid Cu and numerous elements (Cl, Br, J, S, Se, Te, P, Si, Zn) in gaseous phase. The diffusion phenomena observed in various systems are described. The origination of textures in the layer of diffusion products is explained. Seventeen references: 15 USSR and 2 USA (1945-1954). Table.

Institution : Acad. of Sc., USSR, Ural Branch, Inst. of the Phys. of Metals

Presented by : Academician I. P. Bardin, February 28, 1955





APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000102110006-0"

Arkharov, V.I.

USSR / Diffusion. Sintering. E-6

Abs Jour : Ref Zhir - Fizika, No 4, 1957, No 9339

Author : Arkharov, V.I., Gerasimov, A.F., Gruzin, P.L.
Inst : Ural University USSR
Title : Investigation of the Phenomenon of Internal Adsorption on the Boundary of an Aluminum Silver Alloy with Oxide Film, Using the Radioactive Isotope Method.

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 2, 294-302

Abstract : Plates of the alloy Al -- 0.29% Ag, containing a small amount of radioactive isotope Ag^{110} were subjected to a six-hour exposure at 550° in vacuum (10^{-2} -- 10^{-3} mm mercury) to obtain a thin (50 -- 100 A) oxide film, and to rapid cooling. After this, successive layers 500 -- 600 A thick were etched away from the specimen (the thickness of the removed layer was estimated from the decrease in weight of the specimen), and each layer was etched away in a dif-

Category: USSR

B-9

Abs Jour: Zh--Kh, No 3, 1957, 7558

Author : Arkharov, V. I. and Kozmanov, Yu. D.
Inst : Not given
Title : On the High Temperature Oxidation of Tungsten

Orig Pub: Fiz. Metallov i Metallovedeniye, 1956, Vol 2, No 2, 361-369

Abstract: The phase composition of the scale produced on tungsten by oxidation at 500-1350° has been investigated by radiographic methods. The scale formed in the indicated temperature range consists of two layers. The outer layer below 1,000° consists of α-WO_3, and above 1,000°, of α-WO_3; the inner layer consists of γ-WO_3. A change in depth of the lattice constants, ascribed to the formation of anion vacancies is observed in the outer layer. The change in the structure of the scale with temperature, experiments with inert indicators, and the change in depth

Card : 1/2

ARKHAROV, V. I.

USSR/Physical Chem. Crystals B-5

Abs Jour : Ref Zhur - Khimiya, No 7, 1957, 22110

Author : V. I. Arkharov
Inst : Not given
Title : About the letter of S.D. Gerzriken: "Concerning the problem of the mechanism of diffusion."

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 2, 379

Abstract : It is shown that there are very strong deformations of the lattice in the intercrystalline zones which cannot have as their only effect the formation of a large number of vacancies. These deformations influence the energy of the activation of the movement of the atoms on the limits, which is not taken into account by S.D. Gerzriken.

Card 1/1

-35-

ARKHAROV, V.I

Category : USSR/Solid State Physics - Diffusion. Sintering

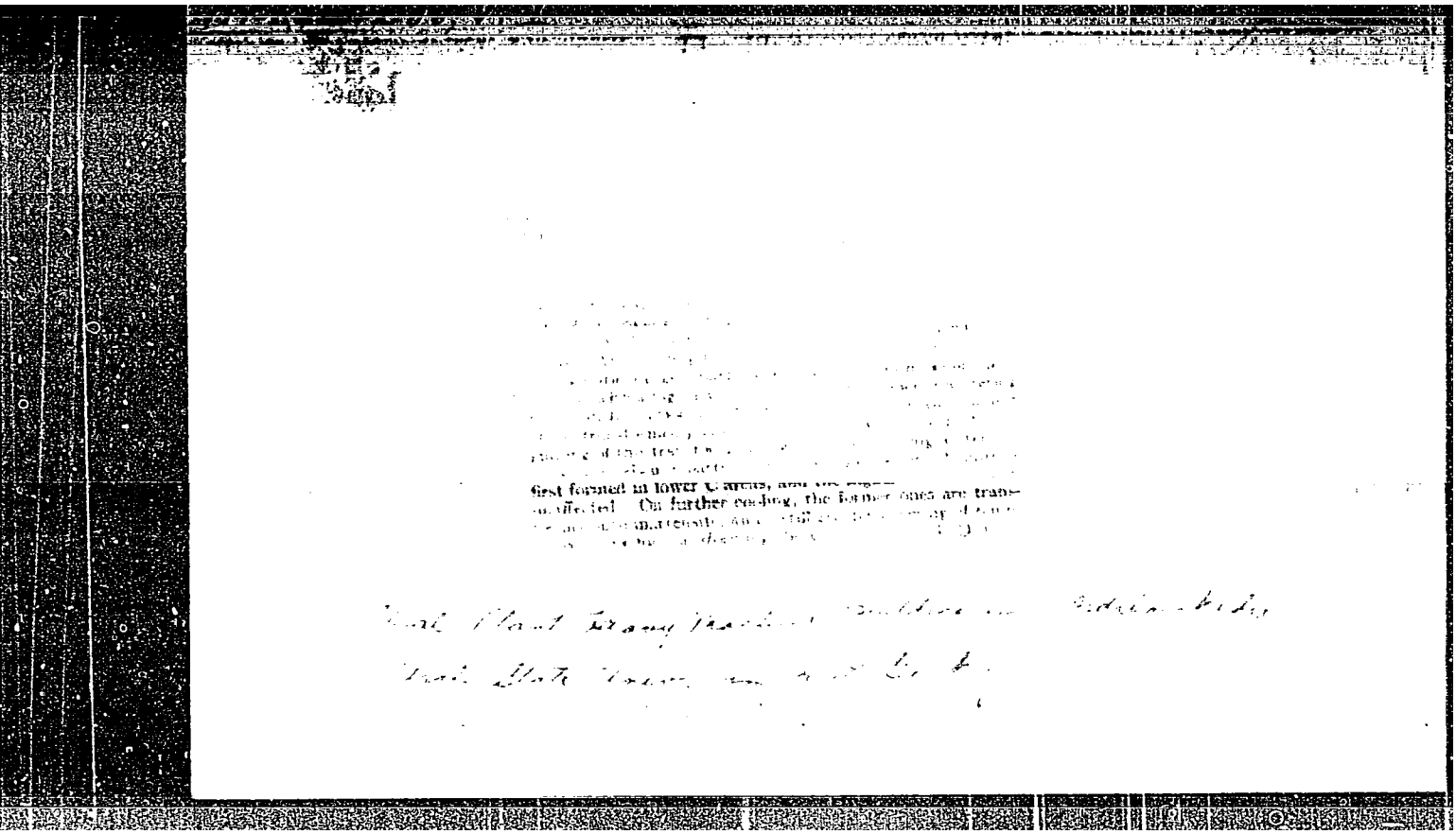
Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6682

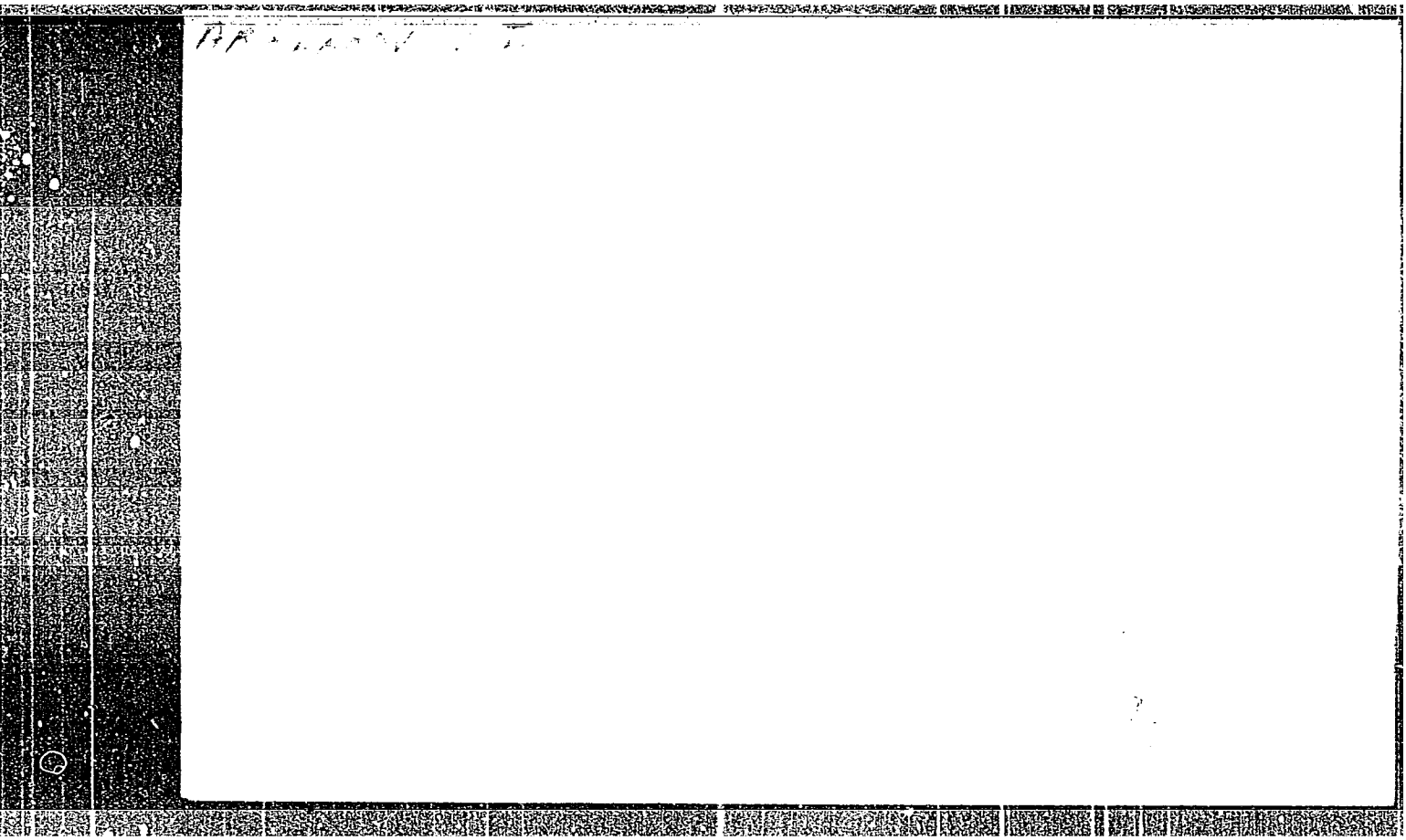
Author : Arkharov, V.I., Moskova, N.I.
Inst : Ural University
Title : On the Influence of a Silver or Zinc Impurities in Aluminum on the Speed of Diffusion of Copper.

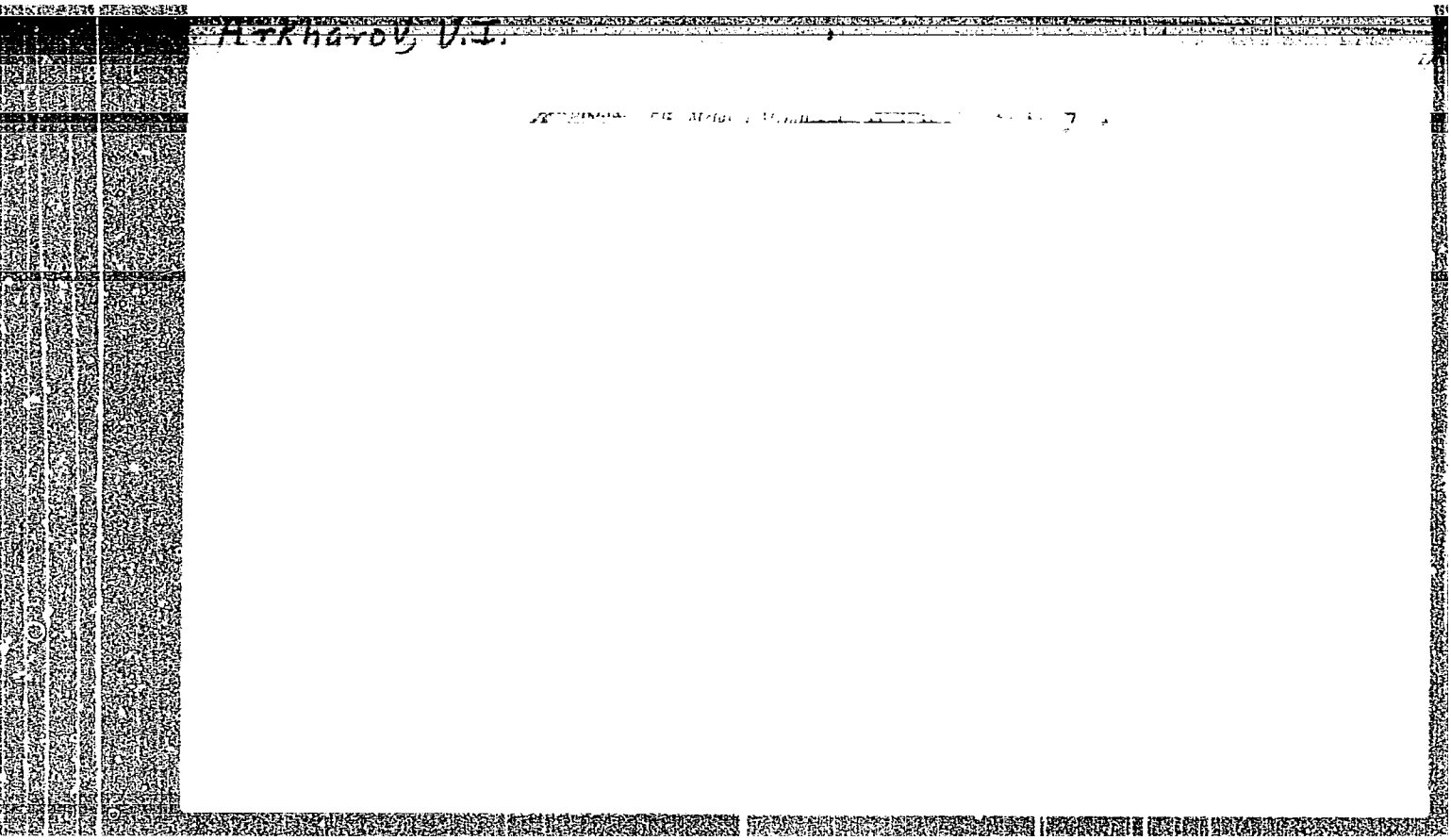
Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 3, 472-476

Abstract : It was established that in a solid solution of silver or zinc in aluminum, at high contents of silver or zinc (10 -- 20%), the speed of diffusion of copper is substantially greater than in pure aluminum. An explanation is offered for the previously-established accelerating influence of small impurities (0.2%) of silver (or zinc) on the speed of decomposition of supersaturated solid solution of copper in aluminum. This influence can be caused by the fact that positive internal adsorption of silver (or zinc) takes place on the periphery of the produced particles of the phase that becomes precipitated from the very beginning stages of their formation, thanks to which the particles turn out to be

: 1/2



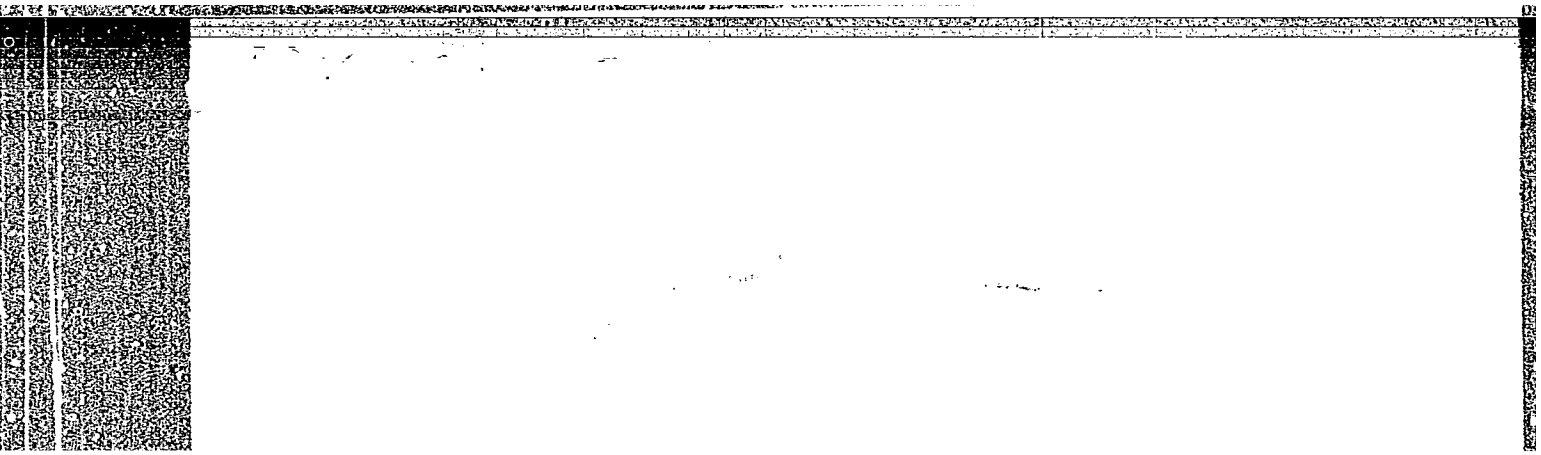




ARKHAROV, V.I.; BORISOV, B.S.

Hematite structure in the external layer of iron scale. Fiz.met. i metallove. 3 no.3:460-467 '56. (MLRA 10:3)

1. Institut fiziki metallov Ural'skogo filiala AN SSSR.
(Iron oxides--Metallography) (Diffusion)



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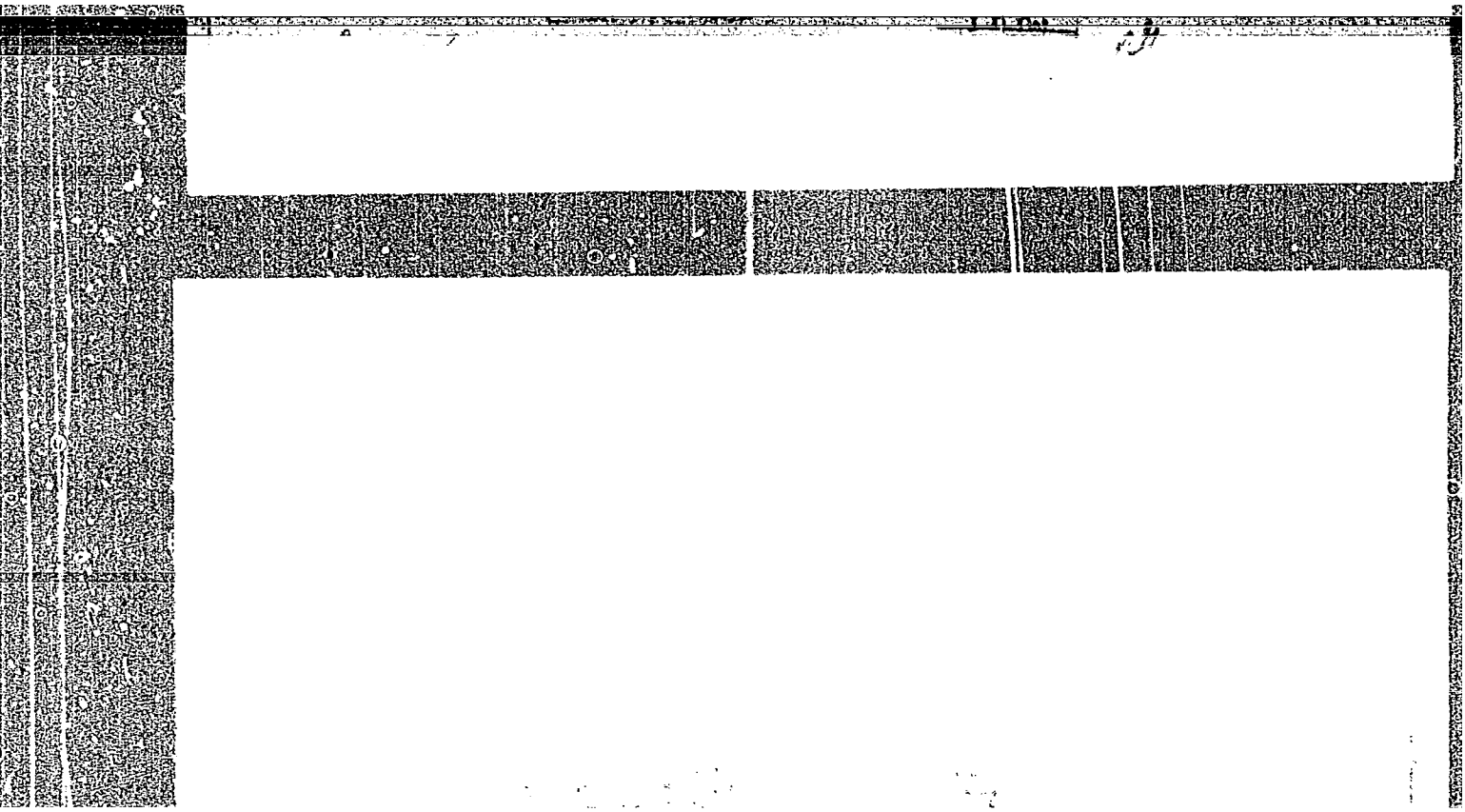

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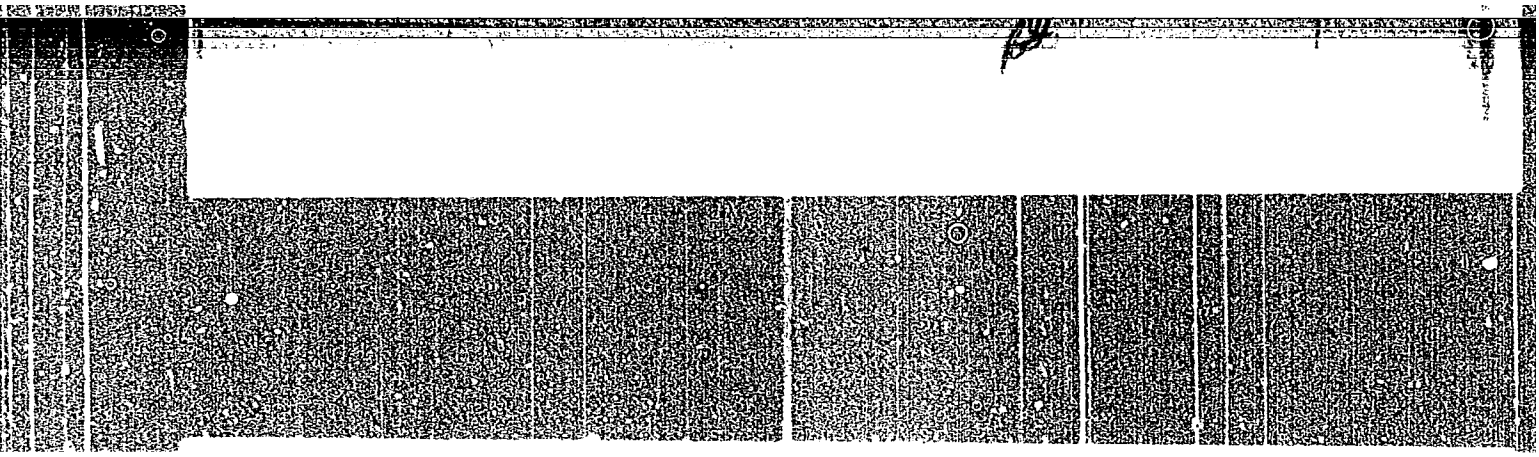

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000102110006-0"

SOV/137-58-8-17694

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 213 (USSR)

AUTHORS: Arkharov, V. I., Moiseyev, A. I., Polikarpova, I. P.

TITLE: An Investigation of the Effect of Small Quantities of Additives on the Kinetics of Aging of Alloys (Issledovaniye vliyaniya malykh primesey na kinetiku stareniya splavov)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN SSSR, 1957. pp 92-97

ABSTRACT: Hardness measurements were employed in an investigation dealing with the combined accelerating and retarding effect of time-rate-affecting additives on the early stages of the aging (A) process of Cu alloys containing up to 6% of Ag. Sb (up to 0.5%) and Be (up to 0.3%) served respectively as the accelerating and retarding additives. The alloys were prepared from electrolytic Cu (99.9% pure), Ag and Sb (both 99.9% pure), and Be (97.7% pure). Following a two hour anneal at a temperature of 800°C and a period of cooling in the furnace, the ingots were forged at room temperature, in order to reduce their thickness from 8 mm to 6mm. and rolled until their final thickness amounted to 5 mm; they were then homogenized in a

Card 1/3

An Investigation of the Effect of Small Quantities (cont.)

charcoal packing for a period of 50 hrs at a temperature of 800° and were allowed to cool in air. After a two-hour exposure to 780-790°, the specimens were quenched in ice water. The A was carried out at 360° the first stage of the process (up to maximum hardness of the alloy) requiring from 0.5 to 2 hrs; the total duration of the process amounted to 3-5 hrs. Every 15 minutes the specimens were taken out of the furnace and were cooled in water, after which their hardness was measured. The average rate of aging was determined from the curves showing the hardness as a function of the A time. It was established that the accelerating and retarding time-rate-affecting additives, present concurrently in a solid solution undergoing decomposition, do not have an additive effect upon the process of A. A maximum rate of A was observed in an alloy with a minimum amount of Be additive (in the presence of Sb); the absolute magnitude of this rate is greater than the rate of A in an alloy with the same concentration of Sb but containing no Be. The absolute magnitude of hardness of alloys containing both Sb and Be is greater than that of alloys containing no additives or only one of the additives. The strong influence of small amounts of Sb and Be on the rate of A is explained by internal adsorption of Sb and Be in distorted zones of the junctions of the primary regions with increased density of Ag concentration, or in zones of new-phase nuclei with their surrounding solid

An Investigation of the Effect of Small Quantities (cont.)

solution. Owing to adsorptional concentration changes in these transitional zones, the rate of Ag diffusion, which is instrumental in the expansion of primary zones of increased density and in further growth of newly-formed crystal nuclei of the precipitating phase, is greatly changed. Bibliography: 18 references.

V. N.

1. Antimony-beryllium-copper-silver alloys--Analysis 2. Antimony-beryllium-copper-silver alloys--Aging

Card 3/3

137-58-6-13316

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 308 (USSR)

AUTHORS: Arkharov, V. I., Borisov, B. S., Mardeshev, S. V.

TITLE: Diffusional Self-hardening as a Factor of High-temperature Deformation (Diffuzionnyy samonaklep kak faktor vysokotemperaturnoy deformatsii)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2, Moscow, AN SSSR, 1957, pp 120-124

ABSTRACT: The phenomenon of diffusional self-hardening of metal was studied under conditions of high-temperature heating. Experiments were performed on cylindrical specimens (S) of polycrystalline, non-texturized Cu freely suspended in the center of an evacuated and sealed ampoule on the bottom of which a certain amount of fine shavings of α brass had been placed. After heating the container to a temperature of 850°C for several hours, the S was withdrawn and a "texturogram" of its surface was taken by means of standard methods. The result was a sharply defined texture (T) characterized by the position of the (110) plane parallel to the external surface. The appearance of T in the surface layer of the S is

Card 1/2

Diffusional Self-hardening as a Factor (cont.)

connected with the process of recrystallization (R) which clearly indicates that the surface layer of the S has become hardened, inasmuch as in their original condition, prior to the diffusion experiment, the S's were not hardened. The appearance of hardening and the R resulting from it are attributed to the diffusion of Zn from the gaseous medium into the surface layer of Cu. It is pointed out that directional character of the resulting stresses is of great importance in this phenomenon (in a plane parallel to the external surface of the S); this is attributable to the radial direction of the diffusion flow which, in turn, determines the alignement of the resulting T of R. The formation of the T takes place within a relatively narrow range of temperatures. It is assumed that a temperature "threshold" of R exists at low temperatures below which no R occurs; also, at exceedingly high temperatures, R does not take place. Analogous experiments dealing with the diffusion of Zn into single crystals of Cu were also performed. It is established that, as a result of the diffusion of Zn from the α brass, the single crystals acquire polygonal shape, as is apparent from the separation of spots on Laue diffraction patterns. Experimental data obtained corroborate the theory on the function of diffusion in producing lattice distortions. Diffusional self-hardening reaches macroscopic proportion only under special conditions (under high-temperature plastic deformations); at low-temperature plastic deformations its role is almost negligible. 1. Metals--Deformation 2. Metals--Temperature factors 3. Metals--Test results

Card 2/2

Arkharov, V.I.

137-58-5-10445

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 223 (USSR)

AUTHORS: Arkharov, V.I., Vangengeym, S.D.

TITLE: An Investigation of Internal Intergranular Adsorption in Alloys by Means of the Reversible Changes Occurring in the Lattice Parameter with Changes in Alloy Grain Size (Issledovaniye mezhkristallitnoy vnutrenney adsorbtsii v splavakh po obratimym izmeneniyam parametra reshetki pri izmenenii velichiny zerna splava)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN SSSR, 1957, pp 125-130

ABSTRACT: Alloys of Ag with Tl, Be, and Zn are investigated. It is shown that when alloy grain size changes, reversible changes in lattice spacing occur, indicating the presence of intergranular internal adsorption in these alloys.

L. V.

1. Silver alloys--Adsorptive properties 2. Crystals--Lattices 3. Grains (Metallurgy)--Metallurgical effects

Card 1/1

137-58-6-12854

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 239 (USSR)

AUTHORS: Arkharov, V.I., Kozmanov, Yu.D.

TITLE: Some Problems of High-temperature Oxidation of Tungsten and Molybdenum and Iron-tungsten and Iron-molybdenum Alloys (Nekotoryye voprosy vysokotemperaturnogo okisleniya vol'-frama, molibdena i splavov zheleza s vol'framom i zheleza s molibdenom)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN SSSR, 1957, pp 131-134

ABSTRACT: The oxidation of Mo, W, and their alloys with Fe within the 500-1350°C temperature range has been investigated. It is established that during the oxidation of W the predominant phenomenon is the diffusion of O_2, whereas during the oxidation of Fe and Fe-Mo-alloys the diffusion has a two-sided character: Fe diffuses toward the surface, O_2 toward the interior. At low temperatures the oxide scale of Fe and Fe-Mo alloys consists mainly of oxides of Fe; at high temperatures the scale of low-alloy compounds has the same content. The scale of high-alloy compounds at temperatures of 800-850°C contains oxides of W

Card 1/2

Some Problems of High-temperature (cont.)

or Mo, also complex oxides, the diffusion in this case has a one-sided character. O_2 diffuses into the interior. During the oxidation of W, Mo, and their alloys with Fe the volatility of the oxides effects a lowering of the heat-stability (refractoriness) of these metals. Delicate structural changes in the crystalline lattice of W, Mo, and the complex FeW_2 and Fe-Mo oxides may considerably change the volatility of the oxide phases. Modification of the structure (inoculation) of the oxide phases is proposed to improve the refractoriness of these alloys.

G.K.

1. Tungsten alloys--Oxidation 2. Molybdenum alloys--Oxidation 3. Temperature --Effectiveness

Card 2/2

ARKHAROV, V.I.; MOISEYEV, A.I.; POLIKARPOVA, I.P.

Investigating the effect of small additions on kenetics of aging in alloys. Issl . po zahropr. splav. 2:92-97 '57.
(MIRA 11:2)

(Alloys--Hardening)
(Crystal lattices)

SOV/137-58-7-15374

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 7, p 206 (USSR)

AUTHORS: Arkharov, V.I., Bogoslovskiy, V.N., Borisov, B.S., Kichigina, Z.P.

TITLE: Details of Scale Structure and Their Significance in the Process of High-temperature Oxidation of Iron and Steel in Relation to the Problem of Heat Stability (Detali struktury okaliny i ikh znacheniye v protsesse vysokotemperaturnogo okisleniya zheleza i stali v syvazi s problemoy zharostoykosti)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN SSSR, 1957, pp 98-119

ABSTRACT: Review of works on the problems of high-temperature oxidation of Fe and steel performed by the diffusion laboratory of the Institute of the Physics of Metals, Ural branch, Academy of Sciences, USSR, jointly with the chair of solid-body physics of the Ural State University. The authors consider the problem of increasing the cohesive forces in the lattices of the oxide phases and the determination of the relationship between the concentration of alloying elements in the metallic phase and in the oxides to be of primary importance in the development of heat stability. Bibliography: 23 references. L.A.

Card 1/1

1. Metals--Oxidation 2. Metals--Temperature factors
3. Metals--Scale

ARKHAROV, V.I.; BORISOV, B.S.; MARDESHEV, S.[deceased]

Diffusion self-hardening as a factor of high temperature deformation. Issl. po zharopr. splav. 2:120-124 '57. (MIRA 11:2)
(Deformations (Mechanics))
(Solutions, Solid)

ARKHAROV, V.I.; VANGENGEYM, S.D.

Investigating internal intergranular adsorption in alloys by reversible transformation of lattice parameters with change of grain size. Issl. po zharopr. splav. 2:125-130 '57.
(MIRA 11:2)

(Solutions, Solid)
(Crystal lattices)

ARKHAROV, V.I., BORISOV, B.S.

Texture of iron scale. Part 9. Electronographic investigation of textures in the hematite layer at varying stages of iron oxidation in the air. Fiz. met. i metalloved. 4 no.1:76-83 '57. (MLRA 10:6)

1. Institut fiziki metallov Ural'skogo filiala Akademii nauk SSSR.
(Iron oxides--Metallography)
(Electron diffraction examination)

AUTHORS: Arkharov, V. I. and Simonova, M. I. 126-2-14/30

TITLE: On the texture of iron scale. X. Texture of Wustite (FeO) Scale. (O teksture v zheleznoy okaline. X. Tekstura v Vyustitnoy okaline).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), Vol.IV, No.2, 1957, pp.278-290 (USSR).

ABSTRACT: In the complex structural picture of multi-layer scale certain characteristics can be detected which permit elucidation of the details of the mechanism of high temperature oxidation and one such characteristic is the texture. In earlier work of the authors of this paper relating to investigation of the texture of scale, improved data were obtained of the mechanism of oxidation of iron (1 and 2) and also of a number of other processes of reaction diffusion (3 to 7). The textures were investigated for cases in which the conditions of oxidation were such that higher oxides could form, namely, Fe_2O_3 in the case of oxidation in air and Fe_3O_4 in the case of oxidation in steam. In these cases FeO (wustite) forms as the internal layer of the scale. For gaining a better conception of the mechanism of oxidation of iron the authors considered it advisable to study oxidation under

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conditions when only FeO could form but not Fe_2O_3 or Fe_3O_4. Such conditions exist during oxidation of iron in an atmosphere with an adequately low partial pressure of oxygen, particularly in mixtures of steam with hydrogen at sufficiently high hydrogen contents. The aim of the here-described work was to study the texture in the scale in the case of oxidation of the iron in a mixture of water vapour with hydrogen, when the scale consists solely of FeO. In the experiments Armco iron specimens of cylindrical shape, 7 mm dia, 110 and 30 mm long were used; at both ends of the specimen holes were drilled to enable their suspension. The surface was polished with emery paper and then the specimens were cleaned in alcohol. The oxidation was effected inside a vertical tubular electric furnace. The oxiding atmosphere with a reduced partial oxygen pressure was obtained by driving hydrogen with a continuous speed through a saturator with water which was placed inside the heated thermostat. From there the mixture of water vapour and hydrogen moved along the tube, which was fitted with a heater and thermal insulation, and fed to the lower end of a quartz tube, from which it then

flowed through the furnace and was led away through the upper end. The flow speed of the hydrogen was controlled by means of a rheometer and maintained constant throughout all the experiments. A growth texture was observed under conditions which exclude the possibility of formation of higher iron oxides when the oxidation of the metallic iron produces on the surface a single phase FeO scale. The crystallographic type of the growth texture of FeO depends on the oxidation ability of the medium and the temperature. For a given temperature, intensification of the oxidation effect of the medium produces successively the following types of texture: (100), (410), (210), (430), (110). For a given composition of the medium, reduction of the temperature in the range of 1150 to 900 C brings about an analagous change in the types of textures. The observed correlation between the character of the texture and the external conditions of oxidation are in agreement with the conception of oxygen adsorption playing a predominant role. Increase of the quantity of oxygen in the adsorption layer, which depends on the speed of feeding oxygen from the external medium and on the slowing down of its removal into

the body of the crystal lattice, leads to a displacement of the type of texture in the sequence mentioned above. Thereby speeding up of feeding of oxygen is fundamentally linked with an increase of the oxidation ability (increased oxygen content) of the medium and a slowing down of the removal of oxygen into the lattice with decreasing temperature, which slows down diffusion into the solid phase. For correlating the observed changes in the types of texture of the FeO with the change in the magnitude of the surface energy of the respective crystallographic faces, the authors propose consideration of the density of filling with atoms of the surface layer (instead of the reticular density of the lattice), determined as a packet of planes parallel to the external surface of the crystal in which the atoms do not screen each other. It is thereby assumed that adsorption of oxygen distorts more those packets which have a regular configuration of atoms (the surface energy of which decreases more slowly) than packets of a more complex configuration. The consequence of this is a change of the relative magnitude of the surface energy of crystallographically differing faces and a

ARKHAROV, V. I.

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AUTHORS: Arkharov, V. I. and Vangengeym, S. D.

TITLE: X-ray investigation of the inter-crystallite internal adsorption in silver base alloys. (Rentgenograficheskoye issledovaniye mezhkristallitnoy vnutrenney adsorbtsii v splavakh na osnove serebra).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), 1957, Vol.4, No. 3, pp. 439-446 (U.S.S.R.)

ABSTRACT: The reversible changes in the parameter of the lattice of a solid solution during changes in the grain size can be utilised for investigating the inter-crystallite internal adsorption in alloys. It is necessary that the coarsening and the breaking up of grains is effected alternately on the same specimen since only in this case can it be ensured that the change in the lattice parameter is not due to secondary causes (burning off of an admixture during heat treatment or liquation non-uniformities in the original ingot). In an earlier paper the author has utilised this method for investigating the inter-crystallite internal adsorption of Sb, Be and Fe in copper and, from measured reversible changes of the lattice parameters of the alloy during measuring of the grain size, conclusions were arrived at on the positive inter-crystallite internal adsorption of Sb and Be in copper.

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X-ray investigation of the inter-crystallite internal adsorption in silver base alloys. (Cont.)

In solid solutions containing two or three admixtures inter-crystallite internal adsorption took place predominantly by one of them, depending on the ratio of their concentration in the alloy. It was also found that, depending on the composition of the alloy, the thickness of the inter-crystallite transient zone varied between 350 and 900 Å. In this paper X-ray investigations are made of the inter-crystallite internal adsorption in systems specially selected and an evaluation is made of the width of the intercrystallite transient zones on the basis of measurement of the lattice parameter in fine and coarse grain states of the alloy. The experiments were made on the binary systems Ag-Tl, Ag-Be, Ag-Zn, Ag-Bi and Ag-Pb. Table 1, p.440 lists some of the characteristics of the components of these systems and Table 2, pp.441-444 lists the changes in the lattice parameter caused by the changes in the grain size. Reversible changes in the lattice parameter during changes in the grain size were observed in specially selected silver base alloys containing various admixtures. The sign of the changes in the lattice parameters indicates positive intercrystallite internal adsorption of Tl, Be, Zn, Bi and lead in silver.

X-ray investigation of the inter-crystallite internal adsorption in silver base alloys. (Cont.)

If two of the above enumerated horophilic admixtures are contained in an alloy, one of them will be subjected to preferential internal adsorption. For various concentration ratios of the horophilic elements in Ag-Tl-Be, thallium will be subjected to preferential adsorption even if the concentration of Be is relatively higher.
There are 2 tables and 12 references, 9 of which are Slavic.

SUBMITTED: January 17, 1957.

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Card 3/3 Gosudarstvennogo Universiteta imeni A. M. Gor'kogo).

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ARKHAROV, V. I.

126-3-8/34

AUTHORS: Arkharov, V. I. and Vangengeym, S. D.

TITLE: On the Factors Influencing Internal Adsorption in Solid Solutions. (K voprosu o faktorakh, vliyayushchikh na effekt vnutrenney adsorbtsii v tverdykh rastvorakh).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), 1957, Vol.4, No.3, pp. 447-449, (U.S.S.R.)

ABSTRACT: According to earlier work of the author (1), a stimulus for internal adsorption is the tendency of the system of atoms forming the solid solution to reduce the excess energy possessed by structural non-uniformities, by regrouping. A particular case of internal adsorption is intercrystallite internal adsorption. If the dissolved component is horophilic it will lead to an enrichment of the intercrystallite transient zones by this component; this enrichment will not exceed a certain limit and will not in itself lead to the evolution of a new phase. The experimental material accumulated so far is inadequate for formulating theoretical horophility criteria in concrete systems of alloys. In the general formulation of the problem it can be assumed that for a small concentration of the dissolved component, as compared to the solubility, a factor favouring adsorption is the larger local distortion in the
Card 1/2 lattice, i.e. a large deviation of the ratio of the atomic radii from unity. The effect of internal adsorption in a

ARKHAROV, V.

AUTHORS: Arkharov, V. I. and Pen'tina, A. A. 126-1-10/40

TITLE: Investigation of the influence of mutual orientation of crystallites on phenomena taking place in intercrystallite groupings. (Issledovaniye vliyaniya vzaimnoy oriyentatsii kristallitov na yavleniya, protekayushchiye v mezhkristallitnykh sochleneniyakh). II. Influence of the mutual orientation of the crystallites on the degree of non-uniformity of the distribution of the concentration of horophilic admixtures of antimony in copper. (Vliyaniye vzaimnoy oriyentatsii kristallitov na stepen' neravnomernosti raspredeleniya kontsentratsii gorofil'noy primesi sur'my v medi).

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol.5, No.1, pp. 68-73 (USSR)

ABSTRACT: Part I of this paper "Technique of Investigating the Influence of the Orientation of Neighbouring Crystallites on Intercrystallite Diffusion" was published in Vol.IV, No.3, 1957, pp. 536-539 of this journal. The investigations described in this paper are devoted to the further development of the conceptions on the effect of internal adsorption and distribution of horophilic admixtures on the basis of crystallographically differing

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Investigation of the influence of mutual orientation of crystallites on phenomena taking place in intercrystallite groupings.
II. Influence of the mutual orientation of the crystallites on the degree of non-uniformity of the distribution of the concentration of horophilic admixtures of antimony in copper.

distribution of horophilic admixtures. Literary data on the influence of disorientation of adjacent crystallites on the boundary energy and intercrystallite diffusion can be summarised thus: it was established that the "surface energy" is dependent on the mutual orientation of grouping crystal grains for disorientation angles not exceeding 50^{o} and that this dependence is characterised by an increase in the excess energy of the intercrystallite zones from zero to maximum for a specific value of the disorientation angle; a dependence was established of the speed of diffusion along intercrystallite boundaries on the disorientation angle of adjacent grains; a dependence was established of the quantity of separations in ageing alloys on $\Delta\theta$ which also indicates a change in the diffusion speed with changing $\Delta\theta$. The problem formulated in this paper was solved by elucidating the quantitative dependence of the speed of the metallographically detected inter-

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Investigation of the influence of mutual orientation of crystallites on phenomena taking place in intercrystallite groupings.
II. Influence of the mutual orientation of the crystallites on the degree of non-uniformity of the distribution of the concentration of horophilic admixtures of antimony in copper.

crystallite diffusion of the indicator component (Ag) from the ambience into the alloy (Cu-Sb) which contained a horophilic admixture (Sb) on the disorientation of crystallites grouping along a boundary where diffusion was observed. The selection of these three elements was based on a number of factors including the fact that the assumption of the horophilic nature of Sb relative to copper was confirmed by a number of experimental results. The applied technique of investigation has been described in detail in the previous part of this paper (Ref.1). The initial materials were of high purity, the copper had a 99.99% purity, the antimony had a purity of 99.97%; the investigated Cu-Sb alloy contained 0.25% Sb. The results are described and discussed. The established influence of disorientation of adjacent crystallites on the degree of nonuniformity of metallographically detected intercrystallite diffusion proves that there is a nonuniform distribution of the antimony concentration

Investigation of the influence of mutual orientation of crystallites on phenomena taking place in intercrystallite groupings.
II. Influence of the mutual orientation of the crystallites on the degree of non-uniformity of the distribution of the concentration of horophilic admixtures of antimony in copper.

along the zones of grain groupings with differing mutual orientations. The disorientation of neighbouring grains also affects the quantity of horophilic admixtures adsorbed in the microcrystallite transient zone which groups them together. This nonuniformity of the internal adsorption along various intercrystallite boundaries also manifests itself on the nonuniform diffusion of silver in the Cu-Sb alloy. Due to the accelerating influence of the antimony, which is dissolved in the copper, on the diffusion of silver in such a solid solution the nonuniformity of the diffusion of silver in the solution of Cu + 0.25% Sb is less pronounced than during diffusion of silver into pure copper where the nonuniformity is due solely to various magnitudes of the excess energy and intercrystallite groupings with various degrees of grain disorientation. The character of the distortions in the intercrystallite zones, which bring about some acceleration of the diffusion of silver

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126-1-39/40

AUTHORS: Arkharov, V. I., Konev, V. N., Trakhtenberg, I. Sh. and Shumilina, S. V.

TITLE: Oxidation of chromium in air and in oxygen. (Okisleniye khroma v vozdukhe i kislorode).

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol.5, No.1, pp. 190-191 (USSR)

ABSTRACT: On the basis of experiments of various authors it can be concluded that the scale on chromium oxided in oxygen as well as in air consists of rhombohedric Cr_2O_3. On the basis of indirect indications the assumption was expressed of the existence of γ-Cr_2O_3 but this has not been established experimentally. The influence of the air nitrogen on the process of oxidation has not been taken into consideration by previous authors, although in principle such an influence is possible at elevated temperatures. In other work of one of the authors (Ref.5) formation of a nitride was observed on the X-ray diffraction patterns as a result of nitriding of chromium which was similar to that interpreted in earlier work (Ref.4) as a sign of presence of γ-Cr_2O_3. For getting a more accurate picture on the mechanism of the phenomenon, the authors

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investigated the oxidation of chromium in air and in oxygen. At various temperatures the kinetics of the scale formation was studied (from the gain in weight of the specimen) and also the phase composition and the texture in the layers of the forming scale (by X-ray diffraction) and the microstructure of the layers. The specimens of electrolytic chromium were made in the form of hollow cylinders by a method described in earlier work (Ref.4). The oxidation in air was effected in a vertical electric furnace whereby the specimen was suspended on a tray of an analytical balance located above the furnace, so that the weight increase could be determined without removing the specimen from the hot part of the furnace. Oxidation in oxygen at a pressure of 160 mm Hg was effected in a closed vertical quartz tube placed inside a tubular electric furnace; by means of a special gate the specimen was displaced from the top, cold part into the hot part without disturbing the atmosphere of the tube and, after a fixed oxidation time, the displacement was in the opposite direction. Oxidation in oxygen was effected at 700, 880 and 1000°C; only a single phase was observed in the scale. Oxidation in

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the room atmosphere was effected at the same temperatures. The outside appearance of the scale was the same for both series of specimens. In the X-ray diffraction patterns an additional diatropic maximum was observed from the layer located between the metal and the outside layer of the rhombohedric chromium oxide; the Debye pattern of this layer is in good agreement with that obtained for the hexagonal Cr_2N and the diatropic maximum d = 1.37 Å also belongs to Cr_2N. Metallographic investigations confirmed the presence of two layers in the scale of chromium oxided in air.
There are 7 references, 4 of which are Slavic.

SUBMITTED: May 29, 1957.

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Arkharov, V. I

126-2-8/35

AUTHORS: Arkharov, V. I., and Yesin, V. O.

TITLE: On the mechanism of reaction diffusion in the systems Cu-Se, Cu-Te, Ag-Se and Ag-Te. (K voprosu o mekhanizme reaktsionnoy diffuzii v sistemakh Cu-Se, Cu-Te, Ag-Se and Ag-Te).

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol.5, No.2, pp. 246-250 (USSR)

ABSTRACT: It was found in earlier work of one of the authors (Refs.1 and 2) that during reaction diffusion a particular type of acicular growth texture develops in certain binary systems of the type metal-gas, which is due to a strongly pronounced anisotropy of the speed of growth of the crystals which form chemical compounds, whereby the diffusion of the metal in the longitudinal direction of the acicular crystal, through the lattice, to the tip is of primary importance. The length of the acicules can reach relatively quickly 5 to 10 mm with thicknesses of 0.1 to 0.3 mm. For obtaining more accurate data on the mechanism of this phenomenon the authors attempted to determine by X-ray methods the concentration gradient along large acicular Cu_2Se crystals under conditions similar to those described in earlier work (Refs.1 and 2),

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